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A Review of the Tribes Diphaglossini and Dissoglottini (Hymenoptera, Colletidae)

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ABSTRACT

A key to the three tribes of the Neotropical subfamily Diphaglossinae is presented, together with keys to the genera of the tribes Diphaglossini and Dissoglottini. The generic apomorphies in all three tribes are summarized in a cladogram. The Diphaglossini includes *Cadegualina* new genus for *Bicornelia andina* Friese and *sericata* Friese; *Cadeguala* (= *Policana*, new synonym) for *C. occidentalis* (Haliday) and *albopilosa* (Spinola), new combination; and *Diphaglossa* for *D. gayi* Spinola.

The tribe Dissoglottini (of which *Mydrosomatini* and *Ptiloglossidiini* are new synonyms) contains *Ptiloglossidia* for *P. fallax* Moure; *Mydrosomella* new genus for *Diphaglossa gaullei* Vachal, and *Mydrosoma* (= *Bicornelia* and *Dissoglotta* new synonyms) for the following species: *opalinum* (Smith) = *metallicum* Smith; *brooksi* new species; *saussurei* (Vachal), new combination, transferred from *Diphaglossa*; *aterrimum* (Friese), new combination, from *Bicornelia* = ? *stenoceratina* Moure (from *Dissoglotta*); *longitarse* (Friese), new combination, from *Bicornelia*; *inusitatum* (Snelling), new combination, from *Bicornelia*; *serratum* (Friese), new combination, from *Bicornelia*; *bohartorum* new species; and *sinaloa* new species.

INTRODUCTION

The tribes of the largely Neotropical colletid subfamily Diphaglossinae were reviewed by Michener (1966). Since that time additional material has become available and a new review of certain groups is needed. The genera of both the Diphaglossini and Dissoglottini are treated. For the former, species and their synonymies and main characters are included, while for the latter all known species are described in detail.

The subfamily Diphaglossinae differs from other Colletidae in two strong synapomorphies: (1) a small stigma, shorter

than the prestigma and not wider than the distance from the inner margin of the prestigma to the costal margin of the wing, and (2) the strongly bifid glossa with each apicolateral lobe much longer than broad and extending laterally or lateroapically. Most species of the subfamily are large and hairy although the new genus *Mydrosomella* contains a species only 10-12 mm long and with the superficial appearance of some Paracolletini.

MATERIALS AND METHODS

The characters in the descriptions are numbered for ready comparison between compara-

ble descriptions. Numbers are not useful for comparison between different classificatory levels, e.g., tribe and genus. The same characters and numbers are used for the generic descriptions in the Diphaglossini and Dissoglottini so that comparisons can easily be made among all the genera. Characters italicized in the descriptions are features of a single taxon only, and the alternatives are not repeated for the other taxa. The metasomal terga and sterna are usually referred to as T I, T II, S V, etc. If the propodeum were counted, these would be abdominal terga II, III, and sternum VI.

Collections housing material, and names of curators who kindly lent specimens for study, are as follows:

Balboa—	Smithsonian Tropical Research Institute, Balboa, Panamá.—D. W. Roubik.
Berkeley—	California Insect Survey, Department of Entomology, University of California.—the late P. D. Hurd, Jr.
Berlin—	Museum für Naturkunde der Humboldt-Universität.—F. Koch.
Curitiba—	Collection of Padre J. S. Moure, Universidade Federal do Paraná.
Lawrence—	Snow Entomological Museum, University of Kansas.
Logan—	Bee Biology and Systematics Laboratory, Utah State University, Logan, Utah—T. L. Griswold.
London—	British Museum (Natural History).—G. R. Else.
Los Angeles—	Natural History Museum of Los Angeles County.—R. R. Snelling.
Mexico—	Instituto de Biología, Universidad Nacional Autónoma de México.
Paris—	Museum National d'Histoire Naturelle.—S. Kelner-Pillault.
Tucumán—	Instituto de Zoología, Fundación Miguel Lillo.—A. Willink.

MIMICRY

A surprising percentage of the species of the subfamily Diphaglossinae resemble superficially unrelated bees occurring in the same regions. There are no biological data to support the view that mimicry is involved. However, I list below some species of Diphaglossinae and in brackets the or-

dinarily much more common bees that they resemble, followed by comments and the area concerned.

Diphaglossa gayi [Queens of *Bombus dahlbomii* Guén.] The large size and red color are distinctive (Chile).

Mydrosoma aterrimum [Black species of *Bombus*.] Moure (1945) indicated the similarity to males of black *Bombus*. Large workers would be almost equally similar. The dark wings as well as size and color suggest *Bombus* (Bolivia, Brazil).

Mydrosoma saussurei [*Melipona becheii* Bennett.] The yellow tergal bands and orange hairs on the anterolateral parts of the thorax suggest this association. As Vachal (1909) noted, this *Mydrosoma* also resembles some species of *Nomia*, but the resemblance is less close, except in abdominal shape, than is that to the *Melipona*. Moreover, *Nomia* is unknown from the region where the *Mydrosoma* has been taken (tropical México).

Mydrosoma opalinum and *brooksi* [Dark *Melipona* such as *M. fasciata* Latreille; possibly some eucerines.] These species look more like diverse groups of bees than the other supposed mimics. The resemblance indicated is strong but perhaps a primitive *Mydrosoma* has this appearance without mimicry (Brazil, Panamá).

Ptiloglossidia fallax [*Thygater analis* (Lepeletier), female, or *Peponapis fervens* (Smith).] Moure (1953) remarked that the female resembled females of *Thygater analis*. I have not seen the female of *P. fallax* but to me the male seems remarkably similar in appearance to *Peponapis fervens* (Argentina).

CLADISTICS

The lettered variables listed below are those for which polarity (ancestral vs. derived characters) can be determined with reasonable certainty, using Paracolletini (or for most characters, other Colletidae as a whole) as the out-group. The initial statements indicate the apomorphies, numbered in cases where there are two or more levels of apomorphic development. The statement of the plesiomorphic condition for each variable follows in parentheses.

a. Flagellomere 1 longer than scape.

- (Flagellomere 1 shorter than scape in most bees.)
- b1. Malar space one third as long as eye or more.
- b2. Malar space two thirds as long as eye or more. (In most bees the length of the malar space is a small fraction of the length of the eye.)
- c. Mandible with two small preapical teeth on upper margin in female. (Mandible with one such tooth.) The presence of two preapical teeth is an unusual and relatively strong character although it appears twice in Figure 1.
- d1. Glossa deeply bifid with apicolateral processes attenuate and pointed.
- d2. Glossa deeply bifid but apicolateral processes rounded. (Glossa shallowly emarginate, as in other colletids.) The statements above indicate that d2 is a reversion toward the plesiomorphic condition, and an apomorphy relative to d1. If d2 is ancestral to d1, then the d1 condition arose three times assuming that the branching patterns of Figure 1 is correct.
- e. Notaulus deep, up to one fourth as long as scutum. (Notaulus short, scarcely impressed, sometimes invisible, as in other bees.)
- f. Arolia absent. (Arolia present in nearly all other colletids.)
- g. Pre-episternal groove absent below scrobal groove. (Pre-episternal groove strong, complete, as in nearly all other colletids.)
- h. Outer hind tibial spur of male not moveable. (This spur moveable in nearly all bees.)
- i. Upper parts of second and third hind tarsal segments of female much expanded. (These areas little expanded in other bees shown here and not expanded in most bees.)
- j. Base of marginal cell a narrow sinus extending to apex of stigma. (Base of marginal cell relatively broad, not a narrow sinus, in other bees.)
- k. Distal parts of wings coarsely papillate. (Distal parts of wings not or weakly papillate in other colletids.)
- l. Second submarginal cell very small, almost pointed toward costal margin. (Second submarginal cell of moderate size in other colletids with three submarginal cells.)
- m. Stigma greatly reduced, much shorter than and no wider than prestigma. (Stigma longer and broader than prestigma in nearly all other colletids.)
- n1. Third submarginal cell equal to or shorter than second.
- n2. Third submarginal cell much smaller than second. (Third submarginal cell larger than second in most Paracolletini, etc.) Character n1 appears three times in Figure 1, which shows that this is not a strong character.
- o1. Jugal lobe of hind wing almost two thirds length of vannal lobe.
- o2. Jugal lobe about half length of vannal.
- o3. Jugal lobe less than half length of vannal. (Jugal lobe three fourths length of vannal or more in most Paracolletini and other colletids.) The characters o2 and o3 do not appear in sequence in Figure 1 but are on different branches of the cladogram. Although logically sequential, their distribution may show their independence; that is, o may be a branched variable.
- p. Pygidial plate of female narrowed at base. (Pygidial plate of female broadened basally in other bees.)
- q. Sternum VII of male without long lateroapical lobes. (Sternum VII with long lateroapical lobes, usually three pairs.) Reduction of the lateroapical lobes occurs in scattered small groups of colletids, two of which are represented in Figure 1. The character is obviously rather weak.
- r. Gonostylus nearly as long as to longer than gonocoxite, somewhat expanded at apex. (Gonostylus, at least free part, much shorter than gonocoxite and not expanded at apex in most other colletids.)
- s. Penis with pair of longitudinal sclerotic bands on under side from vicinity of volsella nearly to apex. (Penis without such bands, as in other bees.)

Figure 1 was prepared by hand using the variables listed above, showing only the apomorphic and not the plesiomorphic conditions. The lack of apomorphies on the line leading to *Caupolicana* could indicate that that genus is paraphyletic. The same may be true for *Cadeguala*, a rather distinctive genus of only two species, but the polarity of some of its characters is not clear. In view of the similarity of the two species, they are best placed in a single genus even if it proves to be paraphyletic.

Cladograms based on larvae of this

DIPHAGLOSSINI

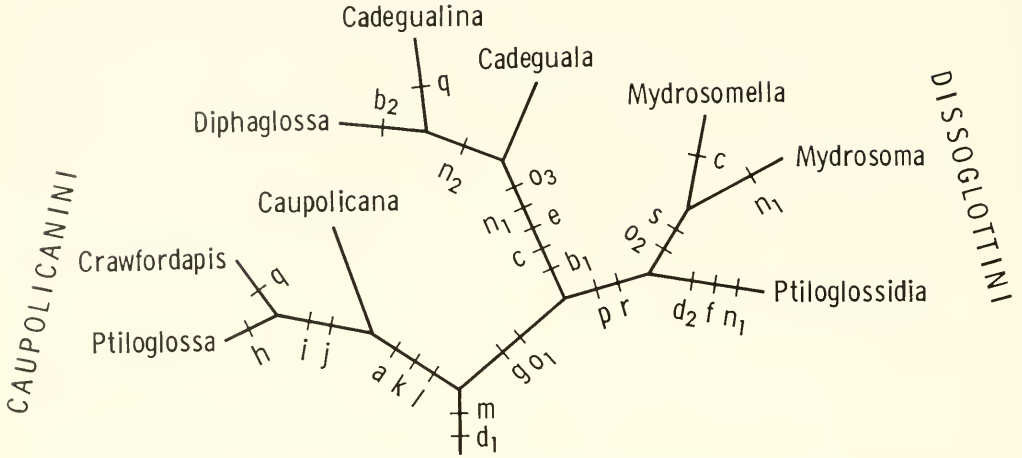


Figure 1. Cladistic relationships of the genera of Diphaglossinae. The letters represent apomorphic characters listed in the section on cladistics; numbers following certain letters represent steps in variables having a series of apomorphic conditions.

group have been prepared by McGinley (1981:285 and in Otis et al., 1982). Larvae of the genera *Caupolicana*, *Crawfordapis*, *Ptiloglossa*, and *Cadeguala* (with *Policana*) were included. The 1982 cladogram is in complete agreement with Figure 1 in the relative positions of branching points. For the 1981 paper the same is true of the preferred cladogram (*Crawfordapis* larvae were not included) although in an alternate cladogram *Caupolicana* is the sister group to all the others. Thus the cladogram shown in Figure 1 based on adult characters is strengthened by independently prepared cladograms based on larval characters. Unfortunately no larvae of Dissoglottini are known. A key to the genera of known mature larvae was presented by McGinley (1981) and the larva of *Crawfordapis* was described in Otis et al. (1982).

- long as middle flagellar segments, not or only moderately petiolate. 2
- 2. Notaulus represented by deep groove in anterior part of mesoscutum; malar space nearly one third as long as eye or longer. Diphaglossini
- Notaulus weak or absent; malar space short or absent . . . Dissoglottini

There is no important new material to add to the account of Caupolicanini published in 1966, except that *Crawfordapis luctuosa* (Smith) has now been found as far south as western Panamá and as far north as the state of Jalisco, México, and its larva and nesting biology have been studied by various authors (Otis et al., 1982; Roubik and Michener, 1985). The other two tribes are treated below.

KEY TO THE TRIBES OF DIPHAGLOSSINAE
(Modified from Michener, 1966)

- 1. Pre-episternal groove complete; flagellomere 1 nearly as long as to longer than scape, much longer than others, petiolate Caupolicanini
- Pre-episternal groove absent below scrobal groove; flagellomere 1 much shorter than scape, less than twice as

TRIBE DIPHAGLOSSINI

Diphaglossinae Vachal, 1909:33.

- 1. Malar space at least 1.5 times as long as basal mandibular width and well over one fourth as long as eye. 2. Mandible of female with two small preapical teeth, thus tridentate, but often worn so that only one preapical tooth is evident. 3. Labrum produced to acute, hairy, medial apical point. 4. Clypeus usually strongly

convex, often protuberant in front of eye by distance as much as eye width (lateral view); apex produced downward well below lower ends of eyes. 5. Vertex seen from front depressed at least laterally, lateral part lower than upper end of eye. 6. Pre-episternal groove absent below scrobal groove. 7. Notaulus deeply impressed in anterior part of scutum. 8. Basitibial plate of female entirely absent or represented by weak carina along posterior margin; hind basitarsus of male half as long as tibia or less. 9. Vein M of forewing meeting or basal to cu-v; second recurrent vein near middle of second submarginal cell. 10. Jugal lobe of hind wing less than half as long as vannal lobe. 11. Pygidial plate of female broadened at base (under TV). 12. Gonostylus not recognizable or if recognized, much shorter than gonocoxite, not expanded distally. 13. Penis not reaching apices of penis valves, without sclerotized rods on under side.

This tribe appeared to be restricted to the Chilean or Araucanian faunal region in 1966, but a genus described below is now known from the Andean area as far north as Venezuela.

The deep notauli are unique among bees and constitute a strong synapomorphy. The long malar areas are also a synapomorphy, although they occur elsewhere in scattered groups of Apoidea.

KEY TO THE GENERA OF DIPHAGLOSSINI

- 1. Malar space about two thirds as long as eye in female, three fourths in male; S III of male with broad, median, apical projection bearing basally directed stiff setae *Diphaglossa*
- Malar space about one third as long as eye; S III of male simple 2
- 2. Third submarginal cell much smaller than second; apex of marginal cell conspicuously obliquely truncate; S VII of male with a small triangular lobe on each side at apex *Cadegualina*
- Third submarginal cell about as large as second; apex of marginal cell narrow so that truncation is inconspicuous or absent; S VII of male with three lobes, two of them large, on each side at apex *Cadeguala*

Cadegualina new genus

Type species: *Bicornelia andina* Friese, 1925.

This genus probably contains only a single species, hitherto placed in *Bicornelia* (a synonym of *Mydrosoma* in the Dissoglottini), ranging from Bolivia to Venezuela. Superficially it resembles fulvous-haired specimens of *Cadeguala occidentalis* but it is probably more closely related to *Diphaglossa*, as shown by the male genitalia and the reduced third submarginal cell. Characters 3, 4, 5, and 15 in the description below show the similarity of this genus to *Cadeguala* and *Diphaglossa*, and dissimilarity from *Mydrosoma*. Character 13 is especially characteristic of *Cadegualina*.

- 1. Clypeus of male about as long as broad, damaged in only female available. 2. Flagellomere 1 of male slightly less than half as long as scape, slightly shorter than 2 which is equal to 3; flagellomere 1 of female as long as 2, which is as long as 3; flagellum of male thick, slightly tapering apically. 3. Malar area less than one third as long as eye in female, more than one third as long as eye in male; base of mandible in front of long axis of eye and at angle of 45° (male) or 50° (female) to that axis. 4. Mandible of female with two preapical teeth; postpalpal part of galea about twice as long as broad, much exceeded by maxillary palpus. 5. Notaulus deeply impressed, over one fourth as long as scutum. 6. Basitibial plate of female indicated only by weak ridge along posterior margin of plate area, the whole area covered by short hairs; male without vestige of plate. 7. Femorotibial scopa dense. 8. Legs of male slender, unmodified; hind basitarsus about half as long as tibia. 9. Third submarginal cell much smaller than large second, which receives first recurrent vein at (in type of *sericata*) or before (in lectotype of *andina*) middle. 10. Side of propodeum with abundant plumose hair below very dense hair of upper lateral area. 11. T VII of male rounded, uniformly punctate, without longitudinal ridge or differentiated area. 12. Exposed sterna of male unmodified; S VI with posterior margin thin, rounded. 13. S VII of male without long apicolateral lobes, apical part of sternum flat, distally notched, with short triangular projection on each side. 14. S VIII of male with apical process slender, hairy, not much directed downward, not strongly curved. 15. Male genitalia with gonostylus short, its base (or adjacent gonocoxal parts) on under side expanded and with brushes of hair.

Cadegualina andina (Friese)
new combination

Figs. 17-20, 62, 63

Bicornelia andina Friese, 1925:12 (lectotype male, Berlin); Snelling, 1980:3.

?*Bicornelia sericata* Friese, 1925:11 (type female, Berlin).

The above synonymy, which was also suggested by Friese (1925), is questionable because the specimen on which the name *sericata* is based is a female labelled Guayaquil, Ecuador, while the name *andina* is based on two males from "Sierra Parime", Venezuela, and one male from Tarata (Cochabamba), Bolivia. The two Venezuelan specimens are in the Berlin museum but the Bolivian specimen cannot be found there according to Dr. Frank Koch. In characters not likely to vary sexually, e.g., wing venation, the males from Venezuela and female from Ecuador are similar.

Snelling (1980) restricted the type locality of *Bicornelia andina* to Sierra Parime, Venezuela. The labels actually read "Venezuela/St. Parime/1897." The locality is almost certainly not the remote Sierra Parime on the Venezuela-Brazilian border, but the modern equivalent of St. Parime is unknown to me, as is the reason for Friese's rendering of "St." as Sierra. I have labelled and here designate one of the two male specimens from Venezuela as lectotype.

Genus *Cadeguala* Reed

Cadeguala Reed, 1892:234. Type species: *Colletes chilensis* Spinola, 1851 (= *Colletes occidentalis* Haliday, 1836) by designation of Sandhouse, 1943:532.

Policana Friese, 1910:651 (new synonym). Type species: *Colletes herbsti* Friese, 1910 (= *Colletes albopilosus* Spinola, 1851) by designation of Sandhouse, 1943:589.

This genus differs from *Cadegualina* and *Diphaglossa* in characters 9 and 10, from *Cadegualina* especially in character 13, and from *Diphaglossa* in characters 1, 3, etc. Like *Diphaglossa* but unlike *Cadegualina* and most dissoglottines, *Cadeguala* has the marginal cell narrow, so that at the apex the cell seems narrowly rounded or obscurely obliquely truncate. *Cadegualina* and the dis-

soglottines have the marginal cell broader so that the apical, oblique truncation is easily recognizable.

1. Clypeus broader than long. 2. Flagellomere 1 of male less than (*albopilosa*) to more than (*occidentalis*) half as long as scape, shorter than or longer than 2 which is as long as 3; flagellomere 1 of female longer or shorter than 2 and 3 together; flagellum of male of approximately uniform thickness. 3. Malar space less than (female) or more than (male) one third as long as eye, directed forward so that in male, mandibular base is entirely in front of longitudinal median axis of eye and in female it is largely so; mandibular base at 45°-55° to that axis; mandible directed somewhat forward in male, not in female. 4. Mandible of female with two preapical teeth; postpalpal part of galea over three times as long as broad, nearly attaining (*albopilosa*) or exceeding (*occidentalis*) apex of maxillary palpus. 5. Notaulus deeply impressed, nearly one fourth as long as scutum. 6. Basitibial plate in female absent, posterior margin represented by weak ridge, whole area covered by dense short hair; in male carina represents posterior margin. 7. Femorotibial scopa dense. 8. Legs of male slender, unmodified (*albopilosa*) or posterior tibia, on posterior margin apically, produced as short lamella (*occidentalis*); hind basitarsus less than half as long as tibia. 9. Third submarginal cell subequal to or slightly smaller than second which receives first recurrent vein near middle. 10. Sides of propodeum of female with only sparse and relatively short hairs, beneath the longer, denser but not extensive hairs of upper lateral area. 11. T VII of male rounded (*albopilosa*) or truncated (*occidentalis*) apically, if rounded with median, basal, impunctate and hairless area, sometimes slightly elevated and extending posteriorly as weak ridge, if truncated with median bare zone broadened posteriorly to width of truncation. 12. Sterna of male unmodified, S VI with margin convex between posterior lateral teeth (*albopilosa*) or appearing concave (but concavity largely filled with transparent cuticle) between weak posterior lateral angles (*occidentalis*). 13. S VII of male with three pairs of apical lateral lobes, all with at least some hair. 14. S VIII of male with apical process robust, directed or curved somewhat downward, not especially long, with weak preapical protuberance. 15. Gonostylus (if present) much shorter than gonocoxite, without dense brushes in region of its base.

This genus probably contains only two species. A generic name is available for

each, and the species could be placed in separate subgenera, but the differences are not great, even though each species has been given generic status (Moure, 1945, 1953). Both are well known in Chile and range into Argentina, one of them also into Bolivia.

KEY TO THE SPECIES OF *CADEGUALA*

- 1. Flagellomere 1 more than half as long as scape, in female over twice as long as 2 (measured on shortest side), in male about 1.5 times as long as 2; posterior tibia of male at apex produced posteriorly as short lamella; sternum VI of male with posterior margin broadly emarginate between lateroapical rounded angles, the emargination largely filled with thin transparent cuticle so that the true margin is scarcely emarginate; sternum VII of male with three apical lobes on each side, basal and distal ones broad and partly hairy, median one slender and hairy only apically. . . . *occidentalis*
- Flagellomere 1 less than half as long as scape, in female about one fourth longer than 2, in male somewhat shorter than 2; posterior tibia of male slender, simple; sternum VI of male with posterior margin convex medially between lateroapical angles; sternum VII of male with three apical lobes on each side, basal one long, curved, nearly hairless and linear, others broad and hairy *albopilosa*

***Cadeguala occidentalis* (Haliday)**

Figs. 2, 21-25, 64

Colletes occidentalis Haliday, 1836:322.
Colletes chilensis Spinola, 1851:220.
Colletes nigroventris Spinola, 1851:221.
Colletes tetra Spinola, 1851:221.
Colletes nigri-ventris Smith, 1853:4.
Cadeguala chilensis, nigroventris and *tetra*: Reed, 1892:233.
Colletes smithii Dalla Torre, 1896:44 (new name for *C. nigri-ventris* Smith, 1853, not *C. nigro-ventris* Spinola, 1851).
Diphaglossa occidentalis and *nigroventris*: Vachal, 1909:54.

Colletes (Policana) chilensis and *tetra*: Friese, 1910:651.
Colletes (Cadeguala) occidentalis and var. *nigri-ventris*: Herbst, 1917a:293.
Cadeguala occidentalis: Herbst, 1917b:283.
Diphaglossa occidentalis and *tetra*: Herbst, 1921: 109, 110.
Policana occidentalis: Herbst, 1923, 27:76.

This large species, known from Chile, western Argentina, and Bolivia, is highly variable. The above synonymy places the form with the wholly black female (*tetra*) in the same species as the common form with fulvous pubescence, as has been suggested by various authors, even Spinola (1851). Wholly black males are unknown but among males with fulvous hair on the head and thorax, there are specimens with the metasomal pubescence fulvous, others with it mostly black. Genitalia and sterna, as well as other structures, seem to be the same in all forms. There is an indication in material in the Snow Entomological Museum that black females are most abundant in the northern part of the range of the species. Field study is desirable to determine the status of the color forms.

I have not examined the relevant type specimens; the above synonymy is based on descriptions and synonymies indicated by the authors listed. An effort has been made to show the history of the names, i.e., the generic associations, but not every subsequent reference.

***Cadeguala albopilosa* (Spinola)
 new combination**

Figs. 26-30, 67

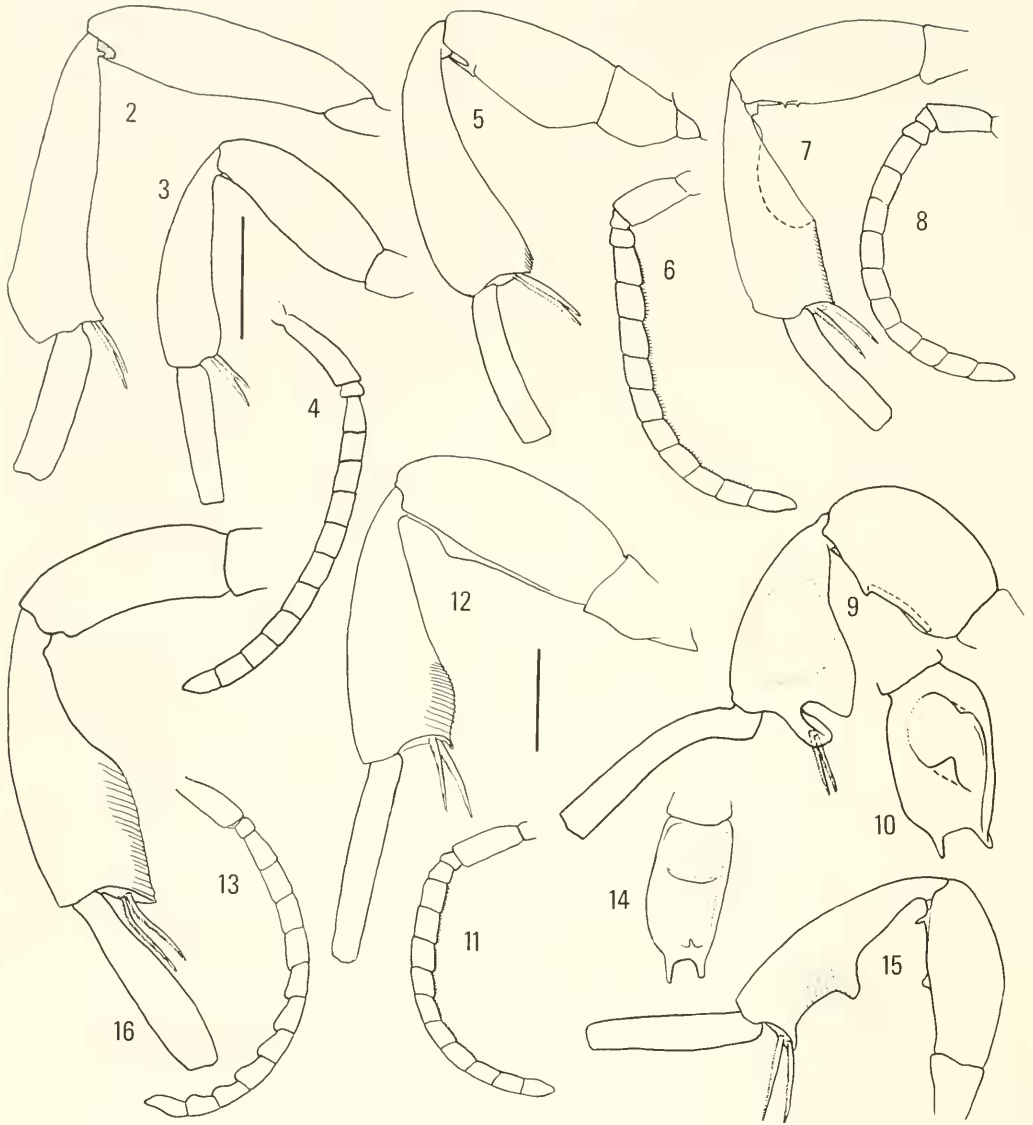
Colletes albopilosa Spinola, 1851:222.
Lonchopria albopilosa: Vachal, 1909:54.
Colletes (Policana) herbsti Friese, 1910:651.
Colletes (Cadeguala) albopilosus: Herbst, 1917b: 294.
Policana herbsti: Herbst, 1923:76.
Policana albopilosa: Moure, 1953:61.

The above synonymy is based on descriptions and other authors' conclusions, especially those of Moure (1953).

Genus *Diphaglossa* Spinola

Diphaglossa Spinola, 1851:168. Type species: *Diphaglossa gayi* Spinola, 1851 (monobasic).

This genus contains a single Chilean

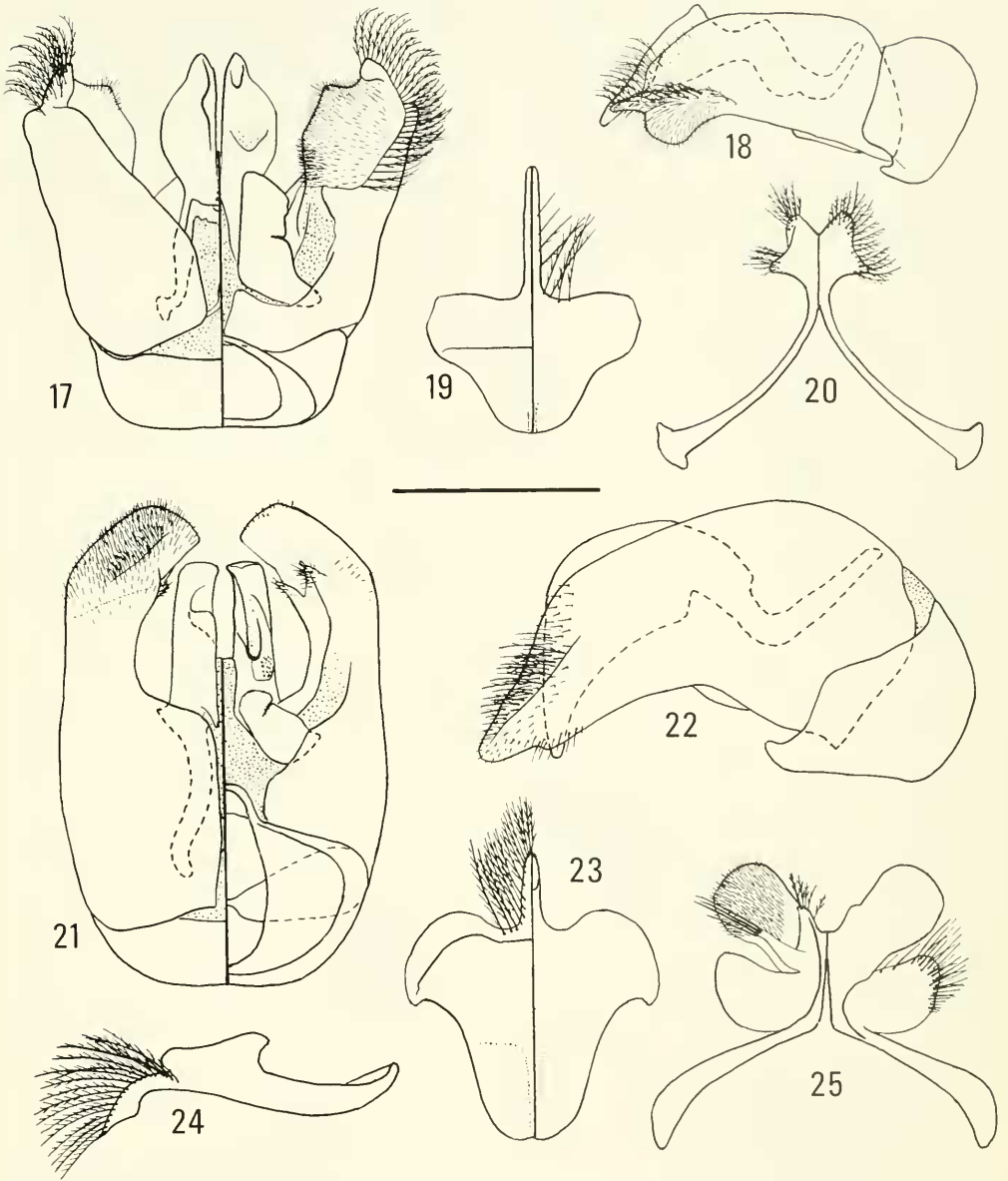


Figures 2-16. Outer views of hind legs, antennae, and under surfaces of hind femora of males. Scale lines = 1 mm; one is for Figs. 2 and 3 only, the other for all others. 2, *Cadeguala occidentalis*; 3, 4, *Mydrosomella gaullei*; 5, 6, *Mydrosoma opalinum*; 7, 8, *M. brooksi*; 9-11, *M. saussurei*; 12, 13, *M. longitarse*; 14, 15, *M. inusitatum*; 16, *M. serratum*.

species. It is large (17-19 mm long) and covered with orange-red hair. Characters 1, 3, and 12 are especially distinctive. The slender marginal cell is discussed under *Cadeguala*.

1. Clypeus longer than broad; labrum and parts of mandible and clypeus yellowish in male; inner orbits diverging below, only slightly so in male. 2. Flagellomere 1 of male half as long as scape, nearly as long as 2 which is nearly as long

as 3; flagellomere 1 of female about 1.5 times as long as 2 which is somewhat shorter than 3; flagellum of male slightly tapering, distal segments smaller in diameter than basal ones. 3. Malar area enormous, two thirds as long as eye in female, three fourths in male, directed forward so that although mandible is not directed anteriorly in female and only moderately so in male, mandibular base is entirely far anterior to longitudinal median axis of eye; mandibular



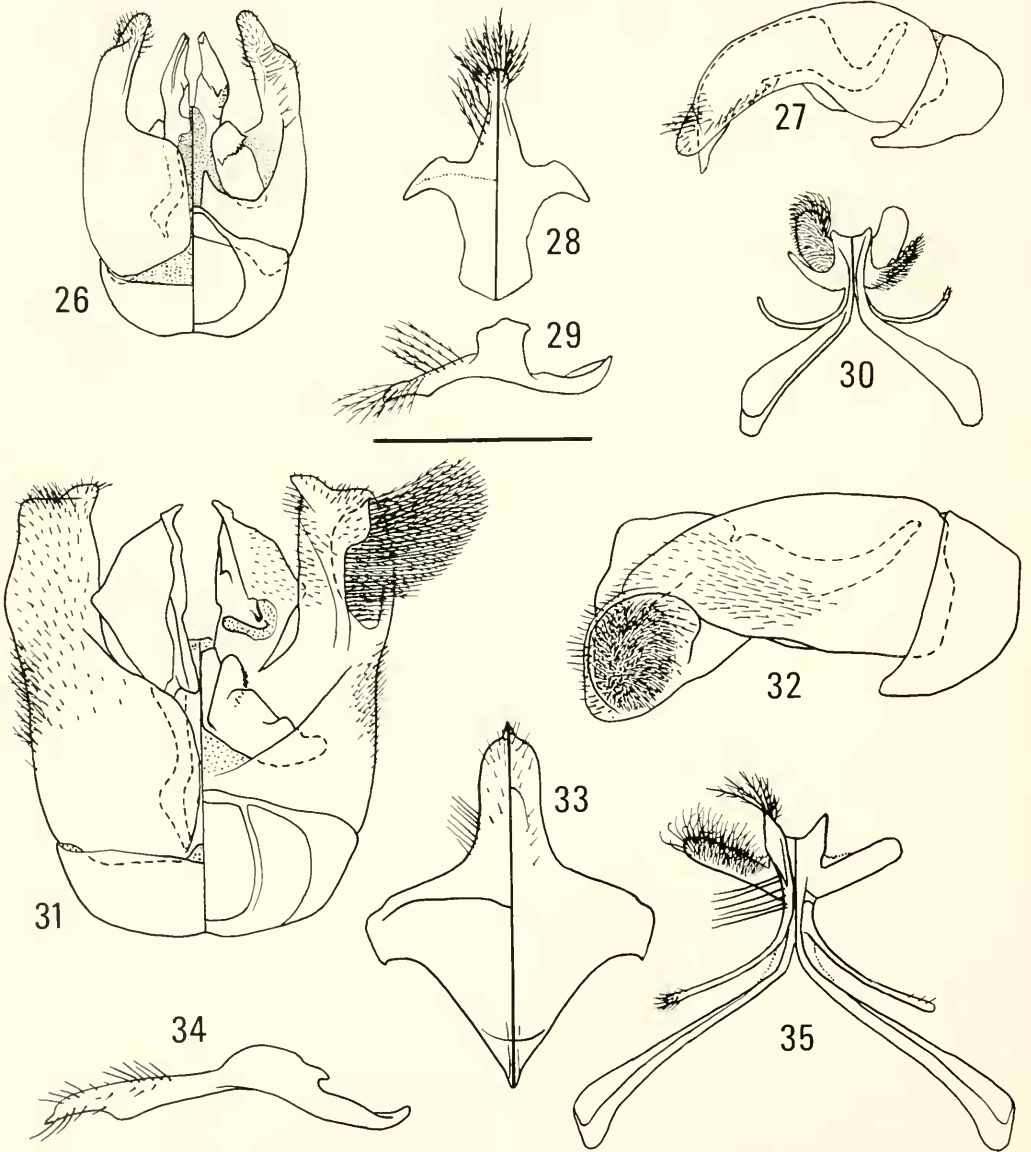
Figures 17-25. Male genitalia (dorsal view on left, ventral on right); side view of same; eighth and seventh metasomal sterna, the latter recognized by diverging basal apodemes (dorsal view on left, ventral on right); and side view of eighth sternum when it is not rather flat. Scale line = 1 mm. 17-20, *Cadegualina andina*; 21-25, *Cadeguala occidentalis*.

base at angle of about 45° to that axis. 4. Mandible of female with two preapical teeth; postpalpal part of galea over three times as long as broad, maxillary palpus reaching galeal apex. 5. Notaulus deeply impressed, nearly one fourth as long as scutum. 6. Basitibial plate of female absent, area covered by dense hairs;

basitibial plate of male indicated by carina along posterior margin. 7. Femerotibial scopa dense. 8. Legs of male unmodified, slender, hind basitarsus about half as long as tibia, somewhat flattened and slightly curved. 9. Third submarginal cell much smaller than second which is large and receives first recurrent

vein near middle. 10. Side of propodeum of female with abundant plumose hair, that of upper lateral part not much denser. 11. T VII of male rounded, with small median apical angle and longitudinal median sparsely haired zone which is elevated basally, apically sparsely haired zone broadened but not elevated. 12. S III of male with median, apical, truncate projection densely covered with anteriorly directed coarse hairs; S V with apex broadly emarginate; S VI appearing subtruncate with preapical me-

dian densely hairy thickening or convexity, behind which is convex transparent margin. 13. S VII of male with three pairs of apical lateral lobes, all hairy, distal ones small, basal ones straplike. 14. S VIII of male with apical process robust, curved downward, with basal protuberance on under side. 15. Gonostylus (if present) with projecting part minute, base (or adjacent parts of gonocoxite) with large brush of dense hair arising in deep pocket on outer surface.



Figures 26-35. Explanation as for 17-25. 26-30, *Cadeguala albopilosa*; 31-35, *Diphaglossa gayi*.

Diphaglossa gayi Spinola

Figs. 31-35, 65

Diphaglossa gayi Spinola, 1851:170.

This well known species is the only member of its genus.

TRIBE DISSOGLOTTINI

Dissoglottini Moure, 1945:142; 1953:73.

Ptiloglossidiini Moure, 1953:71; Michener, 1966:719 (new synonym).

Mydrosomini Michener, 1966:719 (new synonym).

The tribal name Dissoglottini has priority and must be used according to Article 40 of the International Code of Zoological Nomenclature, even though *Dissoglotta* is here considered a synonym of *Mydrosoma*. Ptiloglossidiini is a subjective synonym; I think it does not warrant recognition at the tribal level.

1. Malar space shorter than basal width of mandible, sometimes virtually absent, its length only small fraction of length of eye. 2. Mandible of female with a single preapical tooth (apex of pollex), thus bidentate except in *Mydrosomella* which has a third small tooth. 3. Labrum produced to an obtuse, hairy median apical angle. 4. Clypeus usually rather flat, not strongly protuberant, apex produced downward not over about one fourth its length below lower ends of eyes. 5. Vertex flat or convex seen from front, lateral part not much if any depressed. 6. Pre-episternal groove absent below scrobal groove. 7. Notaulus absent or nearly so. 8. Basitibial plate of female invisible because of hair covering, but complete or represented at least by elevated area without sharp margin or by ridge or carina along posterior margin of plate area (not seen in *Ptiloglossidia*); hind basitarsus of male more than half as long as tibia. 9. Vein M distal to cu-v of forewing; second recurrent vein before middle of second submarginal cell. 10. Jugal lobe slightly less than to slightly more than half as long as vannal lobe of hind wing (in *Ptiloglossidia* jugal lobe almost two thirds as long as vannal). 11. Pygidial plate of female rather broadly rounded, narrowed at base (under TV) instead of broadened as in most bees (not examined in *Ptiloglossidia*). 12. Gonostylus about as long as gonocoxite, usually expanded distally (in *Mydrosomella* not differentiated and scarcely expanded). 13. Penis variable.

This tribe is found in tropical and south

temperate America from Mexico to Argentina but appears to be absent from Chile where the Diphaglossini is abundant. All the species are rare, known from single or very few specimens.

KEY TO THE GENERA OF DISSOGLOTTINI

1. Arolia absent; glossa moderately bifid, apicolateral lobes longer than wide but not attenuate and pointed *Ptiloglossidia*
- Arolia present; glossa strongly bifid, its apicolateral lobes attenuate, pointed 2
2. Second submarginal cell smaller than third; basitibial plate of female complete, margined (although hidden by hairs) *Mydrosomella*
- Second submarginal cell larger than or rarely the same size as third; basitibial plate of female at most a slightly elevated area with an elevated posterior margin. . . *Mydrosoma*

Genus *Ptiloglossidia* Moure

Ptiloglossidia Moure, 1953:73. Type species: *Ptiloglossidia fallax* Moure, 1953, by original designation and monotypy.

This genus contains a single species, easily distinguished from all others by the lack of arolia, but differing also in numerous other features including the only moderately bifid glossa which is thus intermediate between that of most Colletinae and the deeply bifid and attenuately produced glossa of other Diphaglossinae. I have not seen the female; hence all the information on the female in the following description is based on Moure's (1953) description.

1. Clypeus somewhat broader than long; integument of head of male yellow, female with yellow on labrum, mandible, and genal area. 2. Flagellomere 1 of male about two thirds as long as scape, 1.5 times as long as 2 which is slightly shorter than 3; flagellomere 1 of female as long as 2 and 3 together; flagellum of male of uniform thickness. 3. Malar area short; mandible directed somewhat anteriorly, base mostly in front of longitudinal median axis of eye, at about 70° to that axis. 4. Mandible of female with one preapical tooth; postpalpal part of galea about twice as long as broad, much exceeded by maxillary palpus; glossa moderately

bifid, apicolateral lobes longer than broad, not attenuate as in other genera. 5. Notaulus scarcely evident. 6. *Arolia absent*; basitibial plate of female not described, of male absent. 7. "Femoral-tibial scopa less developed than in other members of the subfamily" (Moure, 1953); this statement would not include *Mydrosomella* which was unknown to Moure. 8. Legs of male unmodified, slender; hind basitarsus more than half as long as tibia. 9. Third submarginal cell as long as and somewhat larger in area than second, which receives first recurrent vein before middle. 10. (Female not seen.) 11. T VII of male rounded, uniformly punctate, without longitudinal median ridge or differentiated area. 12. Exposed sterna of male unmodified but with very long hair; S VI with posterior margin thin, rounded. 13. S VII of male with three pairs of apical lateral lobes, all with hairs, the dorsoapical lobes small. 14. S VIII of male with apical process slender, tapering, hairy, curved somewhat downward. 15. Male genitalia with partly differentiated gonostylus about as long as gonocoxite, slightly expanded apically; penis not quite reaching apex of penis valve, without sclerotic bands on under side.

The following is the only known species.

Ptiloglossidia fallax Moure

Figs. 36-40, 68, 73

Ptiloglossidia fallax Moure, 1953:74 (cotypes, 1 male, 1 female, Curituba, not available for study; 1 male, Tucumán).

This species, known only from the province of Salta, Argentina, was described fully by Moure. There were three cotypes; since Moure described the female first, presumably the female cotype in his collection should be designated as the lectotype. The cotypes were from Salta (presumably the city) and from Coronel Moldes. Two males are from Campo Durán, 51 km NNE of Tartagal, 500 m altitude, March 16, 1984 (R.B. Roberts, Rutgers Univ.).

Mydrosomella new genus

Type species: *Diphaglossa* ? *gaullei* Vachal, 1904.

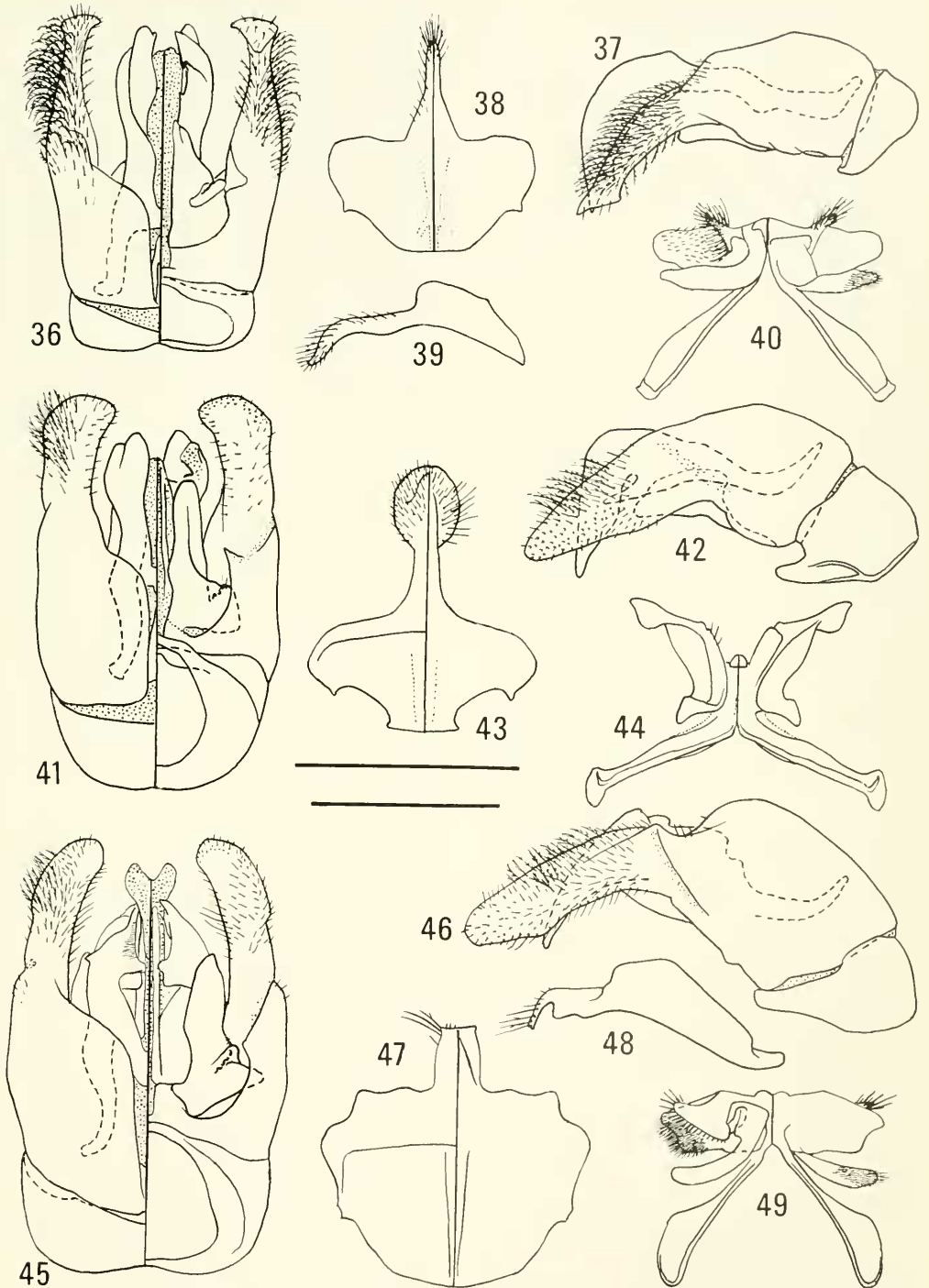
This genus contains a single Argentine species, the smallest of the subfamily Diphaglossinae; it looks superficially like a paracolletine (subfamily Colletinae) rather than like the usually large, long-haired and im-

pressive species of Diphaglossinae. (Females of *Mydrosoma bohartorum*, *sinaloa*, *serrata* and *inusitata* also have a rather "ordinary" or paracolletine appearance.) This aspect is partly a result of the relatively short and not especially dense pubescence of *Mydrosomella*, a feature that distinguishes this genus from most other Diphaglossinae.

1. Clypeus about twice as wide as long in male, even wider in female. 2. Flagellomere 1 of male slightly longer than 2, of female nearly as long as 2 plus 3; flagellum of male of uniform width. 3. Malar area very short, mandible directed anteriorly so that base is nearly all in front of median axis of eye and at an angle of about 45° to that axis. 4. Mandible of female with two small preapical teeth (only one visible in worn mandible); postpalpal part of galea over twice as long as broad, exceeding small maxillary palpus. 5. Notaulus short, weakly depressed; *scutoscutellar suture in a deep fossa, front margin of scutellum nearly vertical.* 6. Basitibial plate of female defined anteriorly and posteriorly by carinae, distally by being slightly elevated; plate hidden by short hairs; plate of male absent. 7. Femoral scopa consisting of relatively few large, long hairs arising along anterior margin of femur and extending down and curving posteriorly to enclose femoral corbicula. 8. Legs of male unmodified; hind basitarsus a little more than half as long as tibia. 9. Third submarginal cell larger and longer than second, which receives first recurrent vein before middle. 10. Side of propodeum of female with only sparse hairs in contrast to long, dense dorsolateral hairs. 11. T VII of male rounded, with longitudinal median hairless ridge. 12. Exposed sterna of male unmodified; S VI with posterior margin thin, rounded between lateral shoulders. 13. S VII of male with two pairs of lobes, both hairless. 14. S VIII of male with apical process straight, distal part of process expanded. 15. Male genitalia with weakly differentiated gonostylus longer than gonocoxite; penis with pair of weakly sclerotized bands along under side.

Although this genus exhibits various apomorphies such as the deep scutoscutellar groove and probably characters 4 and 14, it is the plesiomorphies that are noteworthy, e.g., characters 6, 7, 9, and 10. The genus thus may suggest in some ways what the ancestral Diphaglossinae were like.

Etymology: *Mydrosoma* plus the suffix *-ella*, meaning small and *Mydrosoma*-like.



Figures 36-49. Explanation as for 17-25; the long scale line is for Figs. 41-44, the shorter line for the others. 36-40, *Ptiloglossidia fallax*; 41-44, *Mydrosomella gaullei*; 45-49, *Mydrosoma saussurei*.

Mydosromella gaullei (Vachal)
new combination

Figs. 3, 4, 41-44, 69, 74, 75

Diphaglossa ? *gaullei* Vachal, 1904:23 (type female, Paris).

Male: 1. Length 10 mm; forewing length 7 mm. 2. Inner orbits slightly converging below except upper extremities which converge above. 3. Interantennal distance slightly greater than antennocular distance. 4. Interocellar distance over 2.5 ocellar diameters, equal to ocellocular distance and much greater than ocellocipital distance which is less than 1.5 ocellar diameters. 5. Distance from median to lateral ocellus about equal to diameter of median ocellus (which is larger than lateral). 6. Malar space almost half as long as broad, about half as long as flagellar diameter. 7. Labrum shining, flat except along free margin which is convex, with irregular coarse longitudinal rugae except on free margin. 8. Flagellomere 1 nearly twice as long as broad, longer than either 2 or 3 which are subequal and slightly less than 1.5 times as long as broad. 9. Flagellomeres 2-10 cylindrical, of uniform diameter, i.e., flagellum not tapering apically, middle segments a little over 1.5 times as long as wide. 10. Second recurrent vein basal to third transverse cubital. 11-13. Legs not conspicuously modified, hind femur about three times as long as wide, hind tibia nearly four times as long as wide with large, shining, smooth, almost hairless area on apical half of outer surface. 14. Hind basitarsus a little more than half as long as tibia, straight and parallel-sided, about as long as remaining tarsal segments. 15. Exposed sterna unmodified. 16, 17. Head with fine roughening between punctures strong so that head is dull, lower parts of clypeus and paraocular areas slightly shining; lower third of clypeus with irregular large depressions and without punctures except laterally; punctures small and rather close on lower paraocular area and side of clypeus, elsewhere small, inconspicuous, and widely separated, absent in foveal area which is otherwise not defined and which extends up between lateral ocellus and eye. 18. Thorax with small, widely separated punctures (or hair bases), absent on posterior part of disc of scutum, on strongly minutely roughened ground, somewhat more shiny than most of head; punctures closer along lateral margins of scutum, posterior margin of scutellum, metanotum and upper lateral areas of propodeum; propodeal triangle not punctate, minutely roughened like rest of thorax. 19. Metasomal terga shining with minute roughening finer than on thorax; punctures of T I-IV

small and widely separated, coarser on T V and especially on T VI and VII, on the last rather close except for longitudinal, median, convex, impunctate zone; punctures finer on broad, feebly depressed posterior margins of T I-VI, T I-V with narrow preapical zone of fine close punctures from which white hairs of fasciae arise, margins proper narrowly impunctate. 20. Sterna with surfaces similar to those of terga, S II-V with preapical zones of strong punctures basal to which punctures are very sparse and distal to which are impunctate apical zones much broader than those of terga. 21. Integument black, distal half of mandible and small tarsal segments rufescent; tegula and upper side of flagellum brownish black; under side of flagellum light brown; tibial spurs brown, yellowish apically; posterior margins of terga and entire T VII brownish black, margins of S I-III and entire S VI dark brown, translucent. 22. Wings light grayish brown, veins and stigma dark brown except vein R of forewing which is black. 23. Pubescence of head white, rufescent on labral margin, most of hairs on vertex dusky; pubescence of thorax and legs white, largely blackish on discs of scutum and scutellum (but margins of these sclerites with white) and upper half of pleural region; black hairs also intermixed on upper part of side of propodeum; hairs of small segments of tarsi yellowish orange, on inner sides of basitarsi and tibiae orange, somewhat dusky on mid and hind basitarsi; T I with long white hairs similar to those of thorax, remaining terga with much shorter, suberect hair, white on T II, blackish on others except for some white hairs on ventrolateral parts of terga; T I-V with narrow apical bands of decumbent, white hair; S I-V with long whitish hairs arising from preapical zones of punctures.

Female. 1f. Length 11-12 mm; forewing length 8-8.5 mm. 2f. As in male. 3f. As in male or interantennal distance subequal to antennocular distance. 4f. Interocellar distance little over two ocellar diameters, shorter than ocellocular distance, much greater than ocellocipital distance which is little over an ocellar diameter. 5f. Distance from median to lateral ocellus less than diameter of median ocellus. 6f. Malar space less than or about one third as long as broad, less than or about half as long as flagellar diameter. 7f. As in male. 8f. As in male but second and third segments slightly broader than long. 9f. Flagellum slightly thicker preapically than near base, middle segments slightly broader than long. 10f. As in male. 14f. Hind basitarsus on outer surface shining, scarcely concave, hairs not dense. 16f, 17f. As in

male but lower third of clypeus strongly shining; punctures of sides of clypeus and lower paraocular area widely separated as on most of head; supraclypeal area impunctate except upper and lateral parts; genal area with broad shiny zone. 18f. As in male. 19f. As in male (T VII absent of course); the broad margins with finer punctures and also the premarginal zones of fine punctures are on T I-IV only. 20f. Sterna with punctures coarser than those of terga, dense in premarginal zones of S I-V and on whole of S VI; apical impunctate margins of sterna narrow and hidden by long hairs. 21f. As in male but tegula and upper surface of flagellum black; tibial spurs dark brown; terga without brownish; sterna dark red brown to blackish. 22f. As in male. 23f. Pubescence blackish except as follows: dusky rufescent on mandible, labral apex and clypeal margin; hairs of face below ocelli white with scattered black intermixture, especially on disc of clypeus; hairs of anterior part of scutum and of scutal margins, margins of scutellum, and entire metanotum white, white intermixed among black on much of scutum; posterior lobe of pronotum with bright white hairs posteriorly, many of hairs of pleura, sides of propodeum, and legs dusky rather than black; scopal hairs of anterior margins of hind tibia and basitarsus white; hairs of tarsi largely dusky or dusky orange on outer surfaces, on inner sides of tibiae and tarsi orange or dusky orange to blackish. T I with long white hairs, other terga with hairs short, black except for narrow apical bands of white on T I-IV; prepygidial and pygidial fimbriae black; hairs of sterna yellowish or brownish white, dusky on S VI, blackish hairs intermixed basal to fringe of S II of type.

This species has hitherto been known only from the single female holotype from Tucumán, Argentina [Paris]. The specimen bears no other data; the label reads only "Tucuman, Rep.Arg." It is not clear whether it is the city or the province of Tucumán that is intended, but the former is likely to judge by specific localities cited for other species collected by Girard (Vachal, 1904). The specimen is badly worn, and only one preapical mandibular tooth is evident. Additional specimens are a female and a male, slightly smaller than the type, from Tigre, Buenos Aires Prov., Argentina, 3/10 November, 1956 (collector unknown) [Lawrence].

Genus *Mydrosoma* Smith

Apista Smith, 1862:148 (not Hübner, 1816).

Type species: *Apista opalina* Smith, 1862, monobasic.

Mydrosoma Smith, 1879:5. Type species: *Mydrosoma metallicum* Smith, 1879 (= *Apista opalina* Smith, 1862), monobasic.

Bicornelia Friese, 1899:239 (new synonym).

Type species: *Bicornelia serrata* Friese, 1899, monobasic.

Madrosoma Ashmead, 1899:94 (*lapsus* for *Mydrosoma*).

Egapista Cockerell, 1904:357 (new name for *Apista*). Type species: *Apista opalina* Smith, 1862, autobasic.

Dissoglotta Moure, 1945:144 (new synonym).

Type species: *Dissoglotta stenoceratina* Moure, 1945, original designation and monobasic.

This genus of moderate sized to large bees differs from its relatives by characters 3, 6, 9, the presence of arolia, etc.

1. Clypeus approximately twice as broad as long in female, somewhat longer in male; head without yellow or in male of *longitarse*, *serratum*, and *inusitatum* partly or wholly yellow. 2. Flagellomere 1 of male less than half as long as scape (scarcely so in *longitarse*), shorter than 2 (scarcely so in *longitarse*); flagellum of male tapering so that distal segments, at least in one view, are narrower than basal ones (if processes are omitted on those with serrate antennae). 3. Malar area short, up to three fourths as long as wide; mandible scarcely directed anteriorly, base partly behind longitudinal median axis of eye, at about 80 to that axis. 4. Mandible of female with one preapical tooth. 5. Notaulus scarcely evident. 6. Basitibial plate of female at most indicated by a slightly elevated area with a small ridge on posterior (not distal) side, that of male absent. 7. Femorotibial scopa of dense hairs (less so in *serratum* and *inusitatum*). 8. At least hind tibia of male somewhat enlarged (scarcely so in *opalinum* and *bohartorum*); hind femur and basitarsus sometimes also modified; hind basitarsus of male more than half as long as tibia. 9. Second submarginal cell about equal to third (in *opalinum*) or usually larger than third, receiving first recurrent vein well before middle or in *sinaloa*, interstitial with first transverse cubital. 10. Side of propodeum of female with many coarsely plumose hairs below dorsolateral area of extremely dense, long hairs. 11. T VII of male rounded, distal part with longitudinal median convexity which is more sparsely punctate than rest of tergum, or partly impunctate.

12. Exposed sterna of male unmodified or S V or S VI with small median tubercle; S V with apex broadly emarginate and with apicolateral tufts of dense hair in *serratum* and *inusitatum*; S VI with posterior margin thin and rounded or subtruncate. 13. S VII of male with three pairs of apicolateral lobes, basal one slender and overlying apodeme, distal ones superimposed, one above the other, and sometimes united along posterior margins, all lobes with hairs. 14. S VIII of male with apical process slender, directed ventroapically, often hooked ventrad, with preapical ventral protuberance. 15. Male genitalia with differentiated gonostylus at least as long as gonocoxite, usually expanded apically; penis usually attaining or exceeding apex of penis valve, with pair of longitudinal sclerotic bands on under side extending from vicinity of volsella nearly to apex of penis.

This genus contains several superficially diverse looking species. If one ignores the modifications of the hind legs and antennae of some of the males, however, the species are morphologically similar and appear to form a unified genus. *Bicornelia* was originally proposed for *M. serratum*, a species with the male antennal flagellum strongly serrate, a character shared with *M. inusitatum*. These two species also have a spine on the mid trochanter of the male, and a pair of small convexities on T VI of the male, characters not shared with other species. However, *M. longitarse* also has serrate antennae but lacks the trochanteral spine and the convexities on S VI are adjacent to one another and perhaps not homologous to those of *M. serratum* and *inusitatum*. The under sides of the hind femora of males have perhaps homologous modifications in *M. inusitatum* and *saussurei*, with a similar distal structure also in *M. brooksi* and *opalinum*. The under side of the male hind tibia has apical and preapical projections, perhaps homologous, in *M. inusitatum* and *saussurei*. The hind basitarsus is unusually long, nearly as long as or longer than the tibia, in *M. longitarse* and *saussurei*. Flagellomere 1 of the male is considerably longer than broad in *M. serratum* and *longitarse*, shorter in the others. In *M. bohartorum* the legs and exposed sterna are simple. Considering all the combinations of species and characters listed above, and others based on other characters, the

recognition of subgenera does not seem justified. One could separate *Bicornelia* as a subgenus, but *M. longitarse* bridges the gap between it and other *Mydrosoma* in male characters. Moreover, the female of *M. bohartorum*, a species with simple legs and antennae in the male, is very similar to that of *M. inusitatum* and *serratum*, whose males have the elaborately modified antennae and legs characteristic of *Bicornelia*. See also the discussion under *M. inusitatum*.

M. opalinum and *brooksi* constitute a group of closely related species, as indicated in the description of *brooksi*. The short, transverse basal lamella on S V of the male is an obvious synapomorphy of this pair of species. *M. inusitatum* and *serratum* also are closely related, with many synapomorphies, as detailed in the discussion of the former. *M. longitarse* shares some apomorphic characters such as the serrate male flagellum and yellow on the clypeus with the *inusitatum-serratum* group, but also has numerous presumably plesiomorphic features such as the form of S VII of the male that agree with the *opalinum-brooksi* group and with *M. saussurei*. The last mentioned and *M. aterritum* are apparently isolated among known species, having no close relatives (unless the male of *aterrium*, when it is restudied, shows relationships that are not now apparent).

KEY TO THE SPECIES OF MYDROSOMA

1. Males 2
- Females 9
2. Distal half or more of flagellum strongly serrate; face with yellow (at least apical margin of clypeus yellow) 3
- Flagellum not serrate; face without yellow 5
3. Flagellomere 1 less than half as long as 2; hind tibia with large postmedian tubercle on under surface; hind femur with small, erect premedian lamella and erect apical spine on under side *inusitatum*
- Flagellomere 1 nearly two thirds to three quarters as long as 2; hind tibia merely thickened apically; hind femur thickened and flat on under side, without lamella or spine 4

- 4. Middle trochanter with long apical spine (largely hidden in long hair); face below antennae pale yellow, legs and metasoma largely yellowish red. *serratum*
- Middle trochanter without spine; yellow of face limited to lower margin of clypeus; legs brownish black with red areas on front leg; metasoma black with tergal margins reddish. *longitarse*
- 5. Wings fuliginous; pubescence mostly black. *aterrimum*
- Wings transparent light brownish or yellowish; pubescence of head and thorax largely pale or fulvous 6
- 6. T I-V with apical cream colored integumental bands; hind femur and tibia greatly thickened (Fig. 9). *saussurei*
- Terga without integumental bands; hind femur and tibia not or little thickened. 7
- 7. S V simple; first flagellomere about as long as broad and 1.7 times as long as pedicel *bohartorum*
- S V with short, transverse, median basal lamella suggesting a tubercle; first flagellomere much broader than long and about as long as pedicel. 8
- 8. Hind tibia simple; flagellomeres 2-6 on under side with longitudinal zones of hairs about one sixth as long as flagellar diameter . . *opalinum*
- Distal two fifths of hind tibia parallel-sided, thickened, basal three fifths with broad concavity on lower surface; flagellum without noticeable hairs. *brooksi*
- 9. Wings fuliginous; pubescence largely black *aterrimum*
- Wings transparent light brownish or yellowish; pubescence of head and thorax largely pale or fulvous . . . 10
- 10. T I-IV with apical cream-colored integumental bands *saussurei*
- Terga without strong pale integumental bands 11
- 11. Lower half of clypeus sparsely punctate or impunctate with shining ground, in contrast to dull, minutely roughened ground of upper half . . 12
- Lower half of clypeus coarsely punctate throughout with ground between punctures dull, minutely roughened, like that of upper half. 13
- 12. Malar area about one third as long as flagellar diameter; labrum convex in profile. *opalinum*
- Malar area nearly as long as flagellar diameter; labrum flat in profile *brooksi*
- 13. First recurrent vein interstitial with first transverse cubital vein; hair of S III-V as long as or longer than exposed parts of sterna, abundant, bright fulvous. *sinaloa*
- First recurrent vein entering second submarginal cell; hair of S III-V less abundant and best described as apical fringes or much shorter than exposed parts of sterna, fuscous to yellowish white or fulvous 14
- 14. Midventral hairs of S IV and V much shorter than apical fringes of S II and III; T III and especially T IV with depressed apical zones impunctate basally but with finely and closely punctate apical margins *bohartorum*
- Hairs forming long apical fringes on S II-V; T III and IV with apical zones scarcely differentiated, punctation similar to that of discal parts of terga except for finely and closely punctate apical margins. 15
- 15. Apical pale hair bands of T I-IV narrow and of about equal width *inusitatum*
- Apical pale hair band of T IV markedly broader than bands of T I-II, T III intermediate. *serratum*

Mydosoma opalinum (Smith)
new combination

Figs. 5, 6, 71, 76, 77

Apista opalina Smith, 1862:149 (type female, London).

Mydosoma metallicum Smith, 1879:6 (type female, London).

Egapistia opalina: Cockerell, 1904:357.

Apista metallica: Ducke, 1910:362.

Male: 1. Length 13.5 mm; forewing length 10 mm. 2. Inner orbits slightly converging below except upper extremities which converge above. 3. Interantennal distance about equal to

antennocular distance. 4. Interocellar distance equal to nearly 2.5 ocellar diameters, equal to ocellocular distance, greater than ocelloccipital distance which is equal to nearly two ocellar diameters. 5. Distance from median to lateral ocellus less than ocellar diameter. 6. Malar space over half as long as broad, half as long as minimum diameter of basal part of flagellum. 7. Labrum shining, smooth, convex except flattened medially, with two or three small weak ridges across base. 8. Flagellomere 1 much broader than long, less than half as long as 2 which is slightly over 1.5 times as long as broad. 9. Flagellomeres with surfaces convex so that flagellum is weakly crenulate; distal half of flagellum tapering and therefore more slender than basal half in all views; under surfaces of flagellomeres 2-10 with longitudinal zones of short erect hairs, on 3 to 6 over one sixth as long as diameters of segments. 10. Second recurrent vein almost interstitial with or slightly beyond second transverse cubital. 11. Front and middle legs not modified. 12. Hind femur less than three times as long as broad, under surface smooth and slightly concave between pair of weak longitudinal ridges, inner ridge elevated at apex of femur to form weak transverse prominence or lamella. 13. Hind tibia distinctly over three times as long as broad, expanded apically almost to apex, outer surface unmodified, convex, with hairs, inner surface uniformly concave, hairy; transversely striate part of inner surface limited to area close to spurs. 14. Hind basitarsus nearly two thirds as long as tibia, gently arcuate, thickest apically, shorter than remaining tarsal segments together. 15. S V with short, transverse, median elevated lamella in middle of large, smooth, hairless basal area; S VI with small, smooth, rounded, basal convexity in midst of large, smooth, hairless area. 16. Clypeal surface easily visible through vestiture; clypeal punctation coarse, punctures of lower two fifths of clypeus irregular but mostly separated by nearly a puncture width of shining ground, those of rest of clypeus rather dense except for narrow impunctate zone (widest medially) along epistomal suture, interspaces dull, finely roughened; supraclypeal and most of lower paraocular areas dull, with small, dense punctures; frons with larger (but smaller than most of those on clypeus) and well separated punctures on shining but finely roughened ground; upper paraocular area with broad, depressed, impunctate foveal area extending between lateral ocellus and eye where it is scarcely defined. 17. Vertex with scattered very fine punctures, laterally seemingly impunctate, with band of well-separated punctures across

posterior margin. 18. Thorax with distinct punctures about as large as those of clypeus, mostly separated by more than a puncture width, denser along lateral margin of scutum, margins of scutellum, and sides of propodeum, and widely separated on disc of scutellum and posterior median part of scutum; surface between punctures shining but not highly polished, in most areas minutely roughened; propodeal triangle shining, minutely roughened, impunctate, with a few fine, weak transverse striae across base. 19. Metasomal terga I-IV more finely punctate than thorax, remaining terga about as coarsely punctate as thorax; interspaces smooth, polished, wider than puncture widths except on T VII; punctures finer and closer toward posterior margins of T I-VI, margins very narrowly impunctate. 20. Sterna with punctures similar to those of terga on similarly shining ground, broad basal impunctate zones on T III-VI, broad apical impunctate margin sharply set off from punctate areas on T II-IV, narrower impunctate margin on T VI. 21. Integument black except as follows: labrum, postmedian band across mandible, and distal tarsal segments red-brown; under side of flagellum brown; legs brownish black; tibial spurs yellowish brown; T I-IV with strong blue to bronze metallic tints, posterior parts slightly brownish; T V-VII brownish black to reddish black; sterna red-brown, S II-IV with translucent apical zones. 22. Wings grayish yellow with apical slightly dusky area beyond marginal cell; veins and stigma light brown except vein R of forewing which is black. 23. Pubescence of head, thorax, legs, T I except posterior margin, extreme sides of T I-VI and metasomal sterna dull yellowish white, more yellowish or weakly fulvous on vertex and thoracic dorsum; many dusky hairs on vertex, posterior lobe of pronotum, anterior lateral area of scutum, outer surfaces of mid and hind tibiae and of hind basitarsus; dusky hairs more sparsely intermixed with pale ones on frons, disc of scutum (forming a weak dark area across scutum but leaving anterior extremity of scutum pale except laterally) and disc of scutellum; labrum, mandible, and under sides of tarsi with yellow hairs; posterior parts of T I, and T II-VII except as indicated above, with hair appressed, brownish dusky, not forming apical hair bands.

Female: 1f. Length 13-14 mm; forewing length 9 mm. 2f. As in male but convergence slight. 3f. Supraclypeal area rather uniformly convex, slightly shorter than distance from its upper end (upper margins of antennal sockets) to anterior margin of median ocellus; interantennal distance less than antennocular distance.

4f. Interocellar distance subequal to ocellocular distance and greater than ocellocipital distance, the last about 1.5 times ocellar diameter. 5f. Distance from median to lateral ocellus about two thirds of ocellar diameter. 6f. Malar space about one fourth as long as broad, its length about one third of flagellar diameter. 7f. Labrum shining, smooth, distinctly convex. 9f. Middle flagellar segments about as broad as long. 10f. As in male. 14f. Hind basitarsus on outer surface smooth, shining, concave, with hairs sparse and short. 16f. Clypeus with coarse punctures separated by more than a puncture width, lower median area except along margin more sparsely punctate or impunctate, ground of upper half minutely roughened but somewhat shining, especially along slightly elevated midline; rest of face minutely roughened and dull, frons especially so; supraclypeal area with only minute, widely separated punctures; rest of face and genal area with coarser and closer punctures, but finer than those of clypeus; upper paraocular area with broad, depressed, ill-defined, impunctate, shining foveal area extending up between lateral ocellus and eye. 17f, 18f. As in male. 19f. Metasoma with well separated punctures on smooth, shining ground, coarser on posterior terga than elsewhere. 20f. Punctuation of sterna finer than that of terga, fine and close on posterior sterna. 21f. Integument of head and thorax black, clypeus (especially lower half to fifth) red brown; tegula red brown; legs and basal three fourths of mandible dark red brown; tibial spurs brown; flagellum light brown beneath except for first segment, otherwise dark brown. Metasomal terga yellowish brown except for dark red brown pygidial plate (in type of *opalinum*) or similar but infuscated so that superficially terga seem blackish (in type of *metallicum*), in either case with strong green, brassy, and in places blue reflections; sterna light yellow brown. 22f. As in male but veins (except R) and stigma red brown. 23f. Hair of lower half of face sparse, grayish, rufescent on lower clypeal margin, labrum and mandible, some yellowish dusky hairs on mandible and lower part of genal area; frons with whitish hair, a few interspersed dusky hairs medially; vertex behind ocelli with hair pale fulvous, some dusky hairs intermixed; dorsum of thorax including lateral pronotal lobe with dense, long, pale fulvous hairs, sparse only in middle of scutum, dusky hairs intermixed abundantly (in type of *opalinum*) or sparsely (in type of *metallicum*) on front half of scutum and disc of scutellum; gena and sides and venter of thorax with dense whitish hair; hair of metasomal terga rather short, mostly dusky laterally and on basal part

of T I, scattered dusky hairs intermixed on T V and T VI (type of *opalinum*), or hairs mostly dusky, black laterally and on T I, prepygidial fimbria black except for reddish posterior median area, pygidial fimbria black (type of *metallicum*); posterior margins of T I-IV with narrow apical bands of white plumose hairs arising on extreme margins and extending beyond; metasomal sterna with white hair, II-V with preapical lateral patch of rather short, dusky or black hair and S VI with dusky hair apically (yellowish in type of *opalina*). Hairs of coxae, trochanters, and femora white, blackish on apex of front coxa, undersides of front trochanter and of front femur basally, patches of short dense yellowish hair on under side of mid trochanter and of base of mid femur; scopa of hind femur large, dense, white; apex of hind femur with small area of black hair on upper surface; tibiae and tarsi with hairs dusky to black, darkest on hind legs, yellowish dusky on small segments of tarsi.

The only females seen are the type specimens of *opalinum* and *metallicum* [London]. The color differences between them are noted in the above description. Presumably some or all of these existed when the specimens were fresh. However, the pale wing veins suggest exposure to light, and some of the differences may be due to greater exposure of the type of *opalinum*. The two types are from the same locality and almost certainly conspecific in spite of the color differences.

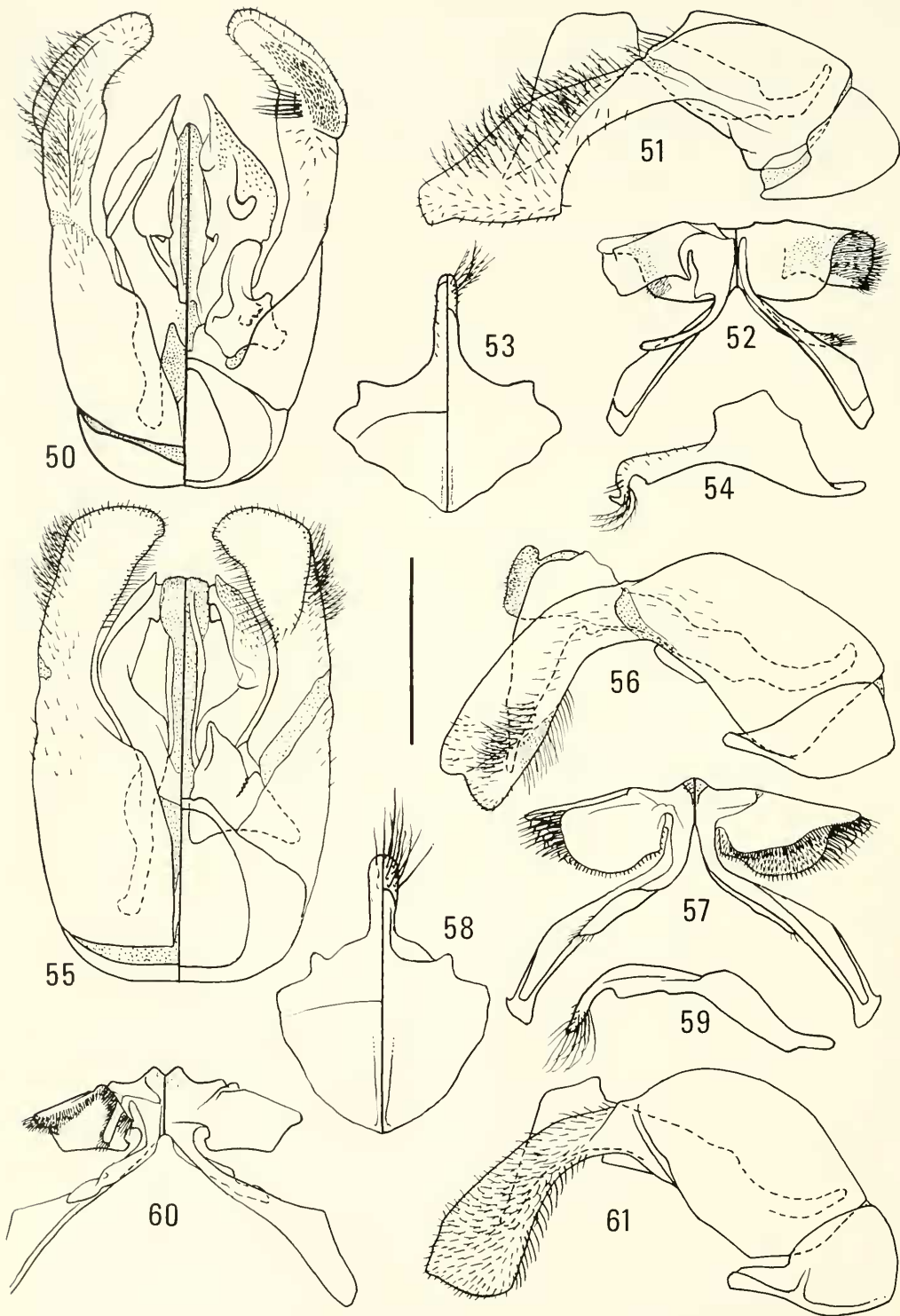
The third known specimen of the species is the male described by Smith (1879), which served as the basis for the above description of that sex. The specimen differs in wing venation from Figure 71 in that the first recurrent vein joins the second submarginal cell about one fourth of the length of the cell from the base. Presumably this difference is neither a specific nor a sexual character.

All three specimens were collected at Ega, which was near Tefé, Amazonas, Brazil [London].

Mydrosoma brooksi new species

Figs. 7, 8, 50-54

Male: Similar to *M. opalinum*, differing from the description of that species as follows: 1. Length 11.5-12 mm; forewing length 9-9.5 mm. 4. Malar space two thirds as long as broad, two thirds as long as diameter of basal part of



Figures 50-59. Explanation as for 17-25. 50-54, *Mydosoma brooksi*; 55-59, *M. longitarse*. Figures 60-61. Seventh metasomal sternum and side view of genitalia of male *M. serratum*.

flagellum. 7. Labrum as in *opalinum* but without weak ridges across base. 9. Erect hairs on under sides of flagellar segments so minute as to be unnoticeable, not longer on segments 2-6 than on subsequent segments. 12. Hind femur almost three times as long as broad, under surface smooth and flat, elevated to form small, transverse, preapical lamella basal to which are one or two similar but smaller transverse carinae (holotype has one; one paratype has two on one side, one on the other). 13. Hind tibia with apical third parallel sided, transversely striate and hairless on lower surface; lower inner surface with broad, sharply margined concavity (broken line in Fig. 7) bearing rather short hairs. 14. Hind basitarsus nearly straight, almost parallel-sided. 16. Clypeus with punctuation of upper three fifths sparser than that of distal part, punctures separated by two or three puncture widths of finely roughened ground; supraclypeal area with punctures separated by about a puncture width and coarser than those of lower paraocular area. 17. Foveal area even less well defined than in *opalinum*. 19. Distal terga not conspicuously more coarsely punctate than basal ones, interspaces greater than a puncture width even on much of T VII. 20. S V with narrow, apical, impunctate zone. 21. Labrum (in holotype but not all paratypes) infuscated; T I-VI with narrow apical testaceous margins; T I (in holotype but not all paratypes) with brown area. 22. Wings somewhat darker than in *opalinum*, apical dusky area less evident. 23. A few dusky hairs intermixed on scape; pale hair of dorsum of thorax fulvous and of upper pleural areas pale fulvous, dusky hairs as in *opalinum*; outer surfaces of all tibiae with dusky hairs; large brush of long hairs on under side of front femur dusky (faintly so also in *opalinum*); hairs of labrum, mandible, under sides of tarsi and of front tibia orange, somewhat dusky on mandible; sides of T I-VI without pale hairs and pale hairs largely limited to basal half of T I; apical half of T I and all of T II-VII with hairs black except for apical row of yellow hairs across T I-V, forming weak apical bands.

Female: Agrees with description of *M. opalinum* except as follows: 1f. Length 13 mm; forewing length 9 mm. 2f. Inner orbits scarcely converging below, upper extremities converging above. 4f. Interocellar distance less than ocellular distance. 6f. Malar space over one third as long as broad, its length almost equal to flagellar diameter. 7f. Labrum almost flat in profile. 8f. Flagellomere 1 slightly longer than broad. 10f. Second recurrent vein slightly basal to third transverse cubital (this is probably neither a sexual nor a specific character). 16f.

Clypeus with punctures of lower median area not sparser than on upper area, but ground nearly smooth, unlike upper area. 20f. Sterna with apical impunctate margins all narrow. 21f. Clypeus nearly all black; legs black, small segments of tarsi rufescent; distal two thirds of mandible red brown. Metasomal terga black, T I-III with diffuse dark yellow brown preapical bands; metallic reflections blue green, strong on T I-III, weak on T IV, absent on T V; sterna brown. 22f. Dusky hairs pale, inconspicuous, and sparsely intermixed with pale fulvous hair on scutum and scutellum; sides of thorax with hairs ochraceous; tergal hairs mostly black, yellowish at extreme sides and on much of T I; prepygidial and pygidial fimbria and apical bands of T I-IV as in *M. opalinum*; preapical patches of black hair on sterna reduced, indicated only on S II and a few hairs on S V; S VI with hairs black. Hind tibia and basitarsus with hairs of anterior margins yellowish white. (Direct comparison with *M. opalinum* was not possible.)

Type material: Holotype male and three male paratypes, 14 km west of El Llano (Carti road km 9), Panamá Prov., Panamá, April 22, 1981, on *Psychotria luxurians* (R. W. Brooks) [Lawrence]. The locality is about 20 km northeast of Chepo. Allotype female, Cerro Campana, Panamá Prov., July 17, 1977 (R. B. and L. S. Kimsey) [Lawrence]. Two of the paratypes are in the collection of R. W. Brooks.

This species is close to *M. opalinum* but striking differences in hind leg and antennal characters of the male differentiate it. Some of the color differences are probably due to fading of the male specimen of *M. opalinum* which was collected over a century ago.

I am pleased to name this species for Robert W. Brooks, who not only collected the only known male specimens but predicted that they would differ from *M. opalinum* when I suspected that they belonged to that species. The female specimen is also from his collection.

Mydrosoma saussurei (Vachal) new combination

Figs. 9-11, 45-49, 70

Diphaglossa saussurei Vachal, 1909:35 (type male, Paris).

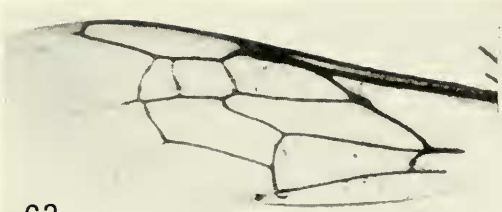
Male: 1. Length 14 mm; forewing length 9 mm. 2. Inner orbits converging below except upper extremities which converge above. 3.

Interantennal distance greater than antennocular distance. 4. Intercellular distance equal to about 2.5 ocellar diameters and greater than ocellocular and ocelloccipital distances; ocellocular distance slightly greater than ocelloccipital distance, the former slightly less than two ocellar diameters. 5. Distance from median to lateral ocellus slightly less than ocellar diameter. 6. Malar space about half as long as broad, length slightly less than flagellar diameter. 7. Labrum shining, smooth, rather flat except for two weak, transverse, basal ridges. 8. Flagellomere 1 as long as broad, about 0.6 times as long as 2 which is slightly over 1.5 times as long as broad. 9. Flagellomeres 4-11 convex on under surfaces so that flagellum is weakly crenulate; distal half of flagellum slightly wider than basal part in upper or lower view but more slender in lateral view. 10. Second recurrent vein interstitial with second transverse cubital or nearly so. 11. Front trochanter with broad, approximately right angular, flat projection on under side near apex; otherwise front and middle legs not modified. 12. Hind femur little over twice as long as broad, under surface with broad concavity delimited by distinct ridge which is carinate or almost so, and in basal inner part is strongly elevated and overhanging margin of cavity, and in distal outer part is produced as thin, acute tooth overhanging cavity. 13. Hind tibia less than twice as long as wide, outer surface with broad, shiny, hairless concavity, inner surface with large shiny hairless area, lower distal part expanded, transversely striate, with deep sinus basal to rounded apical lamella beneath which spurs arise. 14. Hind basitarsus slender, narrowest before middle, as long as tibia, arcuate, especially basally, somewhat shorter than remaining tarsal segments. 15. Exposed sterna without special features. 16. Sculpturing of face largely hidden by long, dense hair; punctuation where visible rather dense, coarse on clypeus, much finer elsewhere; upper paraocular area with broad, depressed, impunctate foveal area extending between lateral ocellus and eye where it is not defined. 17. Vertex with scattered fine punctures, coarser in ocellar triangle and band of well-separated punctures across posterior margin. 18. Thorax with distinct punctures, mostly separated by

more than a puncture width, denser along lateral margins of scutum, posterior margin of scutellum and sides of propodeum, widely separated on disc of scutellum and posterior median part of scutum; surface between punctures shining (although not smooth) on most of scutum but elsewhere dull and minutely roughened; propodeal triangle minutely roughened, impunctate. 19. Metasomal terga mostly more finely punctate than thorax but posterior terga are coarsely punctate, especially VI and VII, punctures finer and more widely separated toward posterior margins of T I-VI, the margins themselves impunctate, not set off by abrupt change in sculpture from discs of terga. 20. Sterna with punctures similar to those of anterior terga, posterior margins impunctate, not set off by abrupt change in sculpture. 21. Integument black except as follows: labrum testaceous except dark margin; mandible yellowish brown, apical third reddish infuscated; under side of flagellum light brown, upper side dark brown, both sides of last 3-4 segments blackish; tegula orange brown (only slightly darker than labrum); front leg dark brown, small segments of tarsus testaceous; middle leg dark brown, under side of femur orange brown, tarsus progressively paler apically, last two segments orange brown; hind leg including spurs orange brown, coxa, trochanter, and area on upper surface of femur dark brown; T I-V with extremely weak metallic bluish or bronzy tints, with apical, rather narrow, pale yellow, opaque bands occupying more than the impunctate areas along margins; tergum VI and exposed sterna with broad, translucent testaceous apical zones. 22. Wings yellowish, veins testaceous. 23. Pubescence of face long, appressed, golden; of thoracic dorsum yellow, orange on the anterior lateral part of scutum; of genal area and side of thorax including propodeum white, grading to yellowish above; of coxae, trochanters, and femora white, grading to yellow on more distal parts of legs, brush of long hair on under side of middle third of front tibia orange to blackish; of metasomal terga yellow, not forming apical bands or fringes; of sterna yellowish white, longest on posterior part of each, forming apical bands of long hair.

Female: 1f. Length 12-14 mm; forewing

Figures 62-72. Forewings. Scale line = 1 mm. 62, *Cadegualina andina* (Venezuela specimen); 63, Same (type of *Bicornelia sericata* from Ecuador); 64, *Cadeguala occidentalis*; 65, *Diphaglossa gayi*; 66, *Mydrosoma aterrimum* (type); 67, *Cadeguala albopilosa*; 68, *Ptiloglossidia fallax*; 69, *Mydrosomella gaullei*; 70, *Mydrosoma saussurei*; 71, *M. opalinum* (type of *metallicum*); 72, *M. longitarse* (type).



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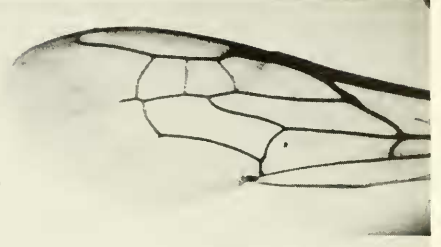
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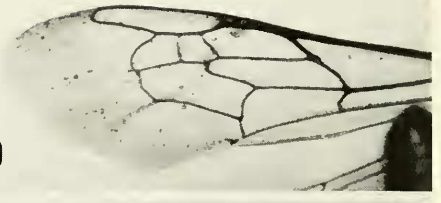
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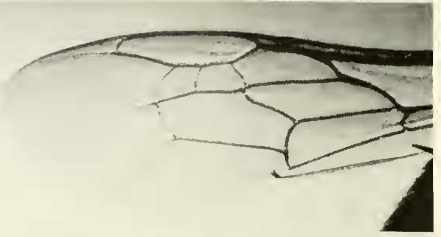
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72

length 8.5 mm. 2f. As in male but convergence slight. 3f. Supraclypeal area in profile flat below, upper part convex; length of area shorter than distance from its upper end (level of upper margins of antennal sockets) to anterior margin of median ocellus; interantennal distance subequal to antennocular distance. 4f. Intero-cellular distance more than twice ocellar diameter, subequal to ocellocular distance, much greater than ocelloccipital distance. 5f. As in male. 6f. Malar space about one third as long as broad, length less than flagellar diameter. 7f. As described for male. 9f. Middle flagellomeres slightly longer than broad. 10f. As in male. 14f. Hind basitarsus on outer surface shining, concave, rather sparsely haired medially. 16f. Clypeus coarsely punctured with broad shining interspaces distally, becoming finely and densely punctate basally except for narrow impunctate zone along epistomal suture; rest of face with rather fine punctures, coarser and well separated by minutely roughened ground on supraclypeal area and lower paraocular areas, finer and more densely punctate on frons and upper paraocular areas except scarcely depressed, ill-defined foveal area which is shining with small, scattered punctures; upper part of foveal area, between eye and median ocellus, not recognizable. 17f and 18f. As in male. 19f. Metasomal terga almost as coarsely punctate as scutum; punctures progressively finer and closer toward posterior margins of T I-IV, punctures extending to tergal margins, margins not set off by abrupt change in sculpture from discs of terga. 20f. S I with punctures similar to those of terga; other sterna with somewhat finer punctures, dense toward posterior margins, sparse and on shining ground toward bases. 21f. Integument black; legs, antenna and pygidial plate dark brown, the following orange brown: labrum, mandible (infuscated apically), under side of flagellum, tegula, small segments of tarsi and tibial spurs; T I-IV with stronger metallic blue, green and bronze tints than in male, with apical rather narrow yellow, opaque bands; bases and apices of sterna I-VI orange brown. 22f. As in male. 23f. Pubescence of head and thorax yellowish white, orange with a few intermixed dusky hairs on anterior lateral parts of scutum, yellow on scutellum, golden to orange on clypeal margin, labral margin, mandible, tibiae, and tarsi; metasomal pubescence mostly yellow, not forming apical bands; prepygidial and pygidial fimbriae orange with some dusky orange hairs; T III-V with a few long, apical white hairs on posterior lateral angles; sternal hairs yellow, forming long apical fringes, extreme apices of S I-V with shorter white hairs.

The holotype was from Orizaba, Vera Cruz, México (Biarth, 1862). Additional specimens, all from the state of Oaxaca, are one male, 8 km east of Temascal, November 25, 1963 (D. H. Janzen, Berkeley); two females, Temascal, November 5, 1963 (R. F. Smith, Berkeley and Lawrence). So far as known only these four specimens have been collected.

The type agrees well with the male from Oaxaca except that the fringe of long hairs on the under side of the middle third of tibia I is blackish instead of orange.

Mydosoma aterrimum (Friese)
new combination

Figs. 66, 78

Bicornelia aterrima Friese, 1925:12 (type female, Berlin).

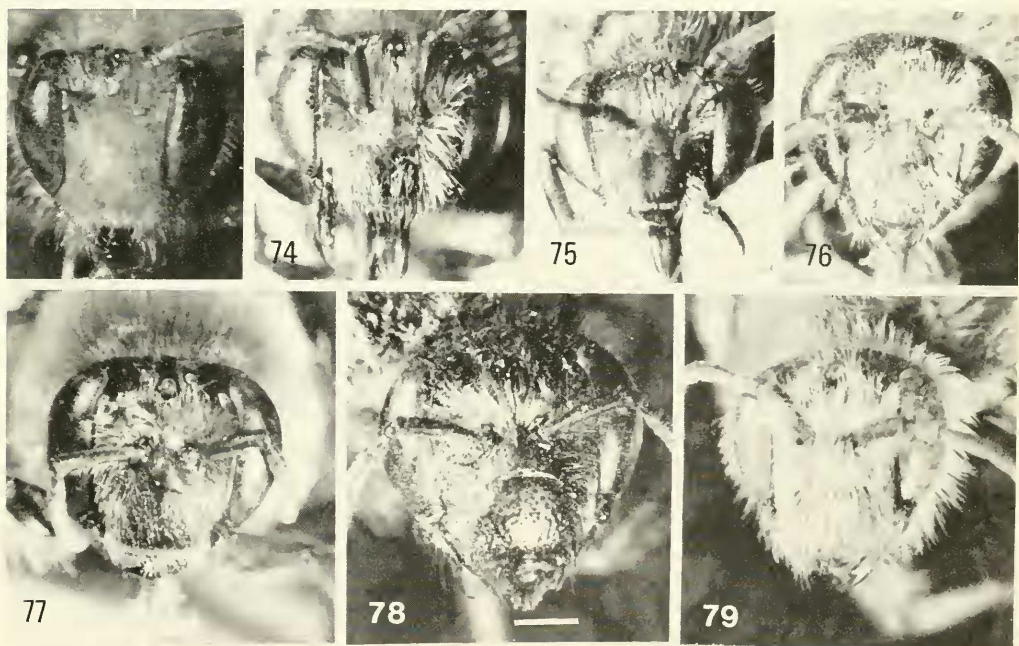
?*Dissoglossa stenoceratina* Moure, 1945:145 (type male, Curitiba, not seen); Moure, 1953:76.

The following description is based on the female type of *aterrimum*. Moure's description of *stenoceratina*, material of which is not available for study, agrees with *aterrimum* in most features except for smaller size (length 14.5 mm) and somewhat less pale pubescence. Moure's male, however, has some pale hairs suggestive of those of Friese's female. Moreover, Friese's specimen is old and some dark brownish or grayish hairs may have been blacker when fresh, which would have resulted in greater similarity between *aterrimum* and *stenoceratina*. Hesitantly I place the latter name in synonymy.

Female: 1f. Length 47 mm; forewing length 11.5 mm. 2f. Inner orbits parallel except upper parts which converge above. 3f. Supraclypeal area uniformly but gently convex, slightly shorter than distance from its upper end (level of upper margins of antennal sockets) to anterior margin of median ocellus; interantennal distance less than antennocular distance. 4f. Intero-cellular distance less than ocellocular distance and nearly equal to ocelloccipital distance, the last nearly twice an ocellar diameter. 5f. Distance from median to lateral ocellus less than two thirds of an ocellar diameter. 6f. Malar space nearly one half as long as broad, its length about two thirds of flagellar diameter. 7f. Labrum with medium triangular, elevated, rather smooth area, apical point of this area rounded,

lateral points extended as ridges to sides of labrum. 9f. Middle flagellomeres slightly longer than broad. 10f. Second recurrent vein joining third submarginal cell at apical sixth. 14f. Hind basitarsus on outer surface flat, shining but rather densely haired. 16f. Clypeus with coarse punctures separated by more than a puncture width, coarser in lower half than basally, ground of upper half minutely roughened but somewhat shining, slightly elevated median line of upper half without punctures; rest of face minutely roughened and dull; supraclypeal area with only a few, widely scattered, moderate-sized punctures, rest of face and genal area with well separated, mostly smaller punctures; upper paraocular area with depressed, impunctate foveal area extending up between lateral ocellus and eye. 17f. Vertex largely impunctate but posterior margin and broader area behind ocellar triangle with distinct, well separated punctures. 18f. Thorax with well separated punctures finer than those of clypeus, finer on dorsum than laterally, posterior median part of scutum impunctate, punctures of scutellum and metanotum dense; ground between punctures in most areas shining and rather smooth on dorsum, slightly roughened laterally especially among the more widely separated punctures of

side of propodeum; propodeal triangle minutely roughened, impunctate, with only weak traces of minute transverse striae at base laterally. 19f. Metasomal terga I to IV with fine, dense punctures, markedly coarser on T V and VI. 20f. Sterna also rather coarsely punctate, much finer on VI, sterna II-IV and to some degree V with small, shining, largely impunctate area laterally in front of area of especially dense punctures and hair. 21f. Integument black without metallic tints, brownish black on clypeus, reddish black on distal part of mandible and tibial spurs; margins of metasomal terga slightly brownish; basal veins and stigma black. 23f. Hair black, whitish around antennal bases and on small, anterior lateral area on scutum; whitish hairs intermixed on upper lateral part of clypeus; bristles on apex of labrum, some of mandibular hairs, and hairs on under sides of tarsi reddish brown; hairs of under sides of head, thorax, and of mid and hind coxae, trochanters, and femora largely grayish, including under side of the large, dense hind femoral scopa; hair of side of thorax including large, dense propodeal scopa brownish, as is hair of S I and II; terga without apical bands of distinctive hair, but hairs arising to tergal margins, a few white hairs intermixed laterally on T 5; tergal hairs of rather uniform



Figures 73-79. Faces. Scale line = 1 mm. 73, *Ptiloglossidia fallax*, male; 74, 75, *Mydosomella gaultei*, female and male; 76, 77, *Mydosoma opalinum*, male and female (type of *M. metallicum*); 78, *M. aterrimum* (type); 79, *M. longitarse* (type).

length, moderately short, decumbant, except for the much longer hairs of the prepygidial and pygidial fimbriae.

The species is known from only two localities. The type of *aterrimum* is from Tarata, Cochabamba, Bolivia (1900), while the two known specimens of *steno-ceratina* are from Itatiaia, Rio de Janeiro, Brazil, the male type from an altitude of 700 m. The female, described by Moure in 1953, was evidently labelled as an allotype but was not a paratype, hence is not a genuine allotype.

Mydosoma longitarse (Friese)
new combination

Figs. 12, 13, 55-59, 72, 79

Bicornelia longitarsis Friese, 1925:11 (type male, Berlin).

Male: 1. Length 17 mm; forewing length 11 mm. 2. Inner orbits subparallel except upper extremities which converge above. 3. Interantennal distance subequal to antennocular distance. 4. Interocellar, ocellular and ocelloccipital distances about equal, each about two ocellar diameters. 5. Distance from median to lateral ocellus nearly two thirds of an ocellar diameter. 6. Malar space nearly as long as broad, length slightly greater than flagellar diameter. 7. Labrum shining, smooth, uniformly convex except for weak transverse basal ridge. 8. *Flagellomere 1 more than twice as long as pedicel and nearly as long as 2* which is twice as long as broad; middle flagellomeres twice as long as broad; 9. *Flagellum crenulate beyond fourth segment, or serrate with projection on each segment low and rounded, markedly lower than in *M. serrata* and *inusitata*; distal segments more slender than basal ones.* 10. Second recurrent vein slightly basal to third transverse cubital. 11. Front and middle legs not modified. 12. Hind femur about 2.5 times as long as broad, under surface flat except for low protuberance on inner margin at apical third. 13. Hind tibia about 2.7 times as long as broad, swollen and transversely striate on under surface distally and produced to a rounded lamella just before bases of spurs. 14. Hind basitarsus cylindrical, over three fourths as long as tibia, slightly shorter than remaining tarsal segments. 15. Exposed sterna without special features except low, median impunctate biconvex elevation on S VI. 16. Sculpturing of face largely hidden by long, dense hair; punctation where visible dense; upper paraocular area with broad, depressed, impunctate foveal area

extending up between lateral ocellus and eye. 17. Vertex impunctate except for zone of distinct punctures along posterior margin. 18. Thorax with strong punctures mostly separated by less than a puncture width, fine and close around margins of scutellum and posterior margin of scutum, sparser in posterior middle part of scutum, impunctate discal area on scutellum; surface between punctures shining but on sides of thorax minutely roughened; propodeal triangle minutely roughened, impunctate. 19. Metasomal terga more finely punctate than thorax, punctures finer and closer toward posterior margins of T I-VI but margins proper rather narrowly translucent and impunctate. 20. Sterna I-VI more coarsely punctate but with similar impunctate apical margins. 21. Integument black except as follows: lower margin of clypeus, labrum, mandible except dark red apex, tegula, areas on under sides of fore and mid femora, front tibia (darkened along posterior margin), tibial spurs, and posterior translucent margins of metasomal terga and sterna testaceous; antenna dark brown, under side of flagellum light brown; legs except as indicated above brownish black, lighter toward apices of tarsi; apices of metasomal terga I-VI, basal to translucent margins, broadly red brown. 21. Wings slightly yellowish brown, veins and stigma testaceous except vein R which is blackish. 22. Pubescence of face long, dense, yellowish white; of ventral surface of head white; of thorax long, dense, light fulvous above grading to white on venter, coxae, trochanters, and under sides of fore femur and tibia; of rest of legs yellowish, yellow on under sides of tarsi; of metasomal terga fulvous, rather dense on apical halves of I-VI, sparser and more erect on basal halves; reddish black hairs intermixed on T V-VII; posterior margins of T I-V with rather narrow apical fringes of plumose yellow hairs; sterna II-V with apical bands of long yellowish hair.

This species is known from a single male specimen from Blumenau, Santa Catarina, Brazil (1900).

Mydosoma inusitatum (Snelling)
new combination

Figs. 14, 15

Bicornelia inusitata Snelling, 1980:3 (holotype male, Lawrence).

This panamanian species was described and illustrated by Snelling. The following characters are added to his description.

Male: Malar space about one fourth as long as wide, length less than half diameter of flagellomere 1. Second recurrent vein slightly basal to third transverse cubital. Hind tibia on lower side preapically with weakly indicated striae, equivalent to those of *M. longitarse* but much weaker. Tegula reddish.

Female: Malar space virtually absent. Tegula dark brown. Head and thorax black, legs dark brown, tibial spurs light brown; metasomal terga brownish black with broad, undefined brown posterior zones, grading into translucent yellowish apical margins; extremely faint bluish or greenish reflections medially on T II and III; fuscous hairs of scutum and scutellum intermixed with ochreous hairs; hairs of apex of hind femur and outer surface of hind tibia black, those of tarsi and tibiae otherwise fuscous except for white on lower margin of hind tibia and on base of that margin of basitarsus; prepygidial fimbria black basally, posterior part consisting of fringe of yellowish red hairs.

The type locality is Madden Forest Preserve (formerly in the Canal Zone), Panamá Prov., Panamá. Additional females were taken from Panamá Province: 23 km northeast of Chepo at km 8 on El Llano-Carti road, on flowers of *Psychotria luxurians*, June 5 and 10, and July, 1982 (D. W. Roubik) [Balboa and Los Angeles].

As noted earlier, males of this species and the next exhibit a considerable series of distinctive synapomorphies. The following is a partial list: Face largely yellow; flagellum strongly serrate (see Figs. 2 and 4 of Snelling, 1980); middle trochanter with thin, transparent apical spine (Fig. 6, Snelling 1980); S VII with basal lateral lobes straplike, modified and perhaps twisted apically, hairless; dorsal distal lobe of S VII reduced to slender projection (Fig. 11, Snelling, 1980); S VIII with small but strongly projecting lateroapical lobes (Figs. 8, 10, Snelling, 1980); gonocoxite with inner apical lobe on dorsal surface (Figs. 12, 13, Snelling, 1980). On the basis of these characters one could apply the name *Bicornelia* to these two species, but the remaining *Mydrosoma* would then constitute a paraphyletic taxon or would have to be divided into about four genera. As noted above, the similarity of females of *M. bohartorum* to those of *M. serratum* and *inusitatum* further discourages any suggestion

of generic or subgeneric status for *Bicornelia*.

Figures 60 and 61 are provided to supplement Snelling's illustrations of *M. serratum* and *inusitatum*. Note that the gonostylar hairs of both species are longer than shown by him and that the gonobase is well developed, as in other *Mydrosoma*. In lateral view the genitalia are similar in the two species. The structure of S VII is also similar in the two species; Snelling shows the specific differences.

Mydrosoma serratum (Friese) new combination

Figs. 16, 60, 61

Bicornelia serrata Friese, 1899:240; Snelling, 1980:3 (holotype male, should be in Berlin, but according to Dr. Frank Koch, cannot be found).

This Mexican species was redescribed and illustrated by Snelling. The supplementary characters indicated above for *M. inusitatum* apply also to *M. serratum*. In spite of the reddish yellow background color of the metasoma, one can see weak bluish or greenish reflections on T I-IV.

The female has not been described. It agrees with Snelling's (1980) description of the female of *M. inusitatum* as elaborated and modified above except as follows: size larger (length 14 mm, forewing 9.5 mm); distal two thirds of front femur and most of front tibia red; distal quarter of mid femur and mid tibia except most of outer surface red; base of outer surface of hind tibia red brown; T I-IV with distinct blue or green reflections; sterna nearly as dark as terga; hairs of tibiae and tarsi more brown than fuscous, only middle third of hind tibia with black hairs on outer surface; hind basitarsus without white hairs; apical whitish fringe of T IV markedly longer than fringes of T I and II, T III intermediate.

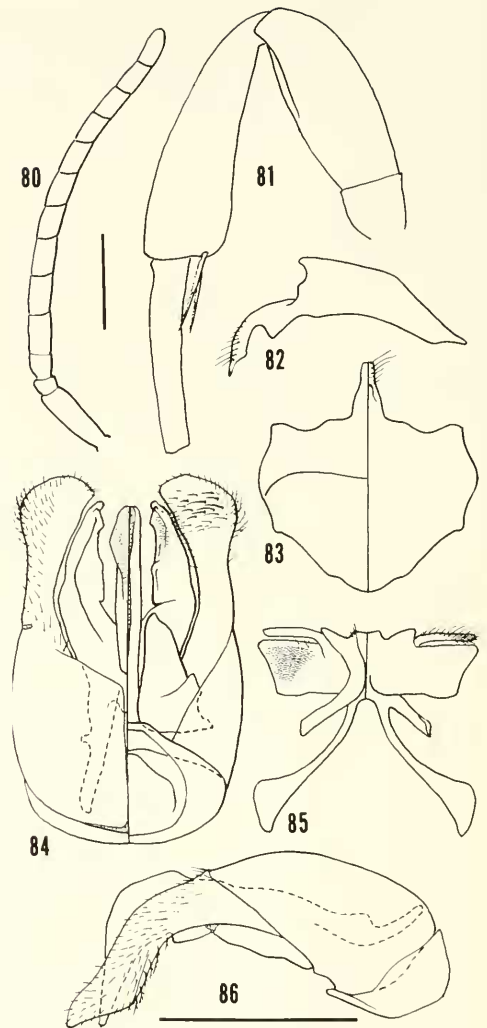
According to Friese, the type, from México, was labelled "Tuzantlu Laurel"; the locality, as Snelling suggests, may have been Tuzantla in the state of Michoacan. Other specimens were recorded by Snelling from 7 km NW of Tequila, Jalisco, México. The species has also been taken at

the Estacion de Biologia near Chamela, Jalisco, Oct. 10, 1982 (a male) and Oct. 22 and 23, 1982, Oct. 26 and Nov. 11, 1983 (females) (S. H. Bullock, collector). In 1985 specimens of both sexes were taken at the same place (along dry water courses in xeric forest) on October 5, 6, and 24 by S. H. Bullock, R. Ayala, J. G. Rozen, Jr., T. Griswold and F. W. Parker. At least at Chamela the species appears to be restricted to flowers of *Triumfetta acracantha* (Tiliaceae) which are open only in late afternoon. Except as noted below, all captures were on this plant from 1730-1800 hrs. Bullock (in litt.) reports that the pollen on specimens available to him is of one type and looks like that of *Triumfetta*. Rozen (in litt.) notes that on October 5 and 6 some females "carried conspicuous amounts of yellow pollen. Both males and females flew swiftly, with little or no hovering, but the females . . . lingered more at the flowers." Males "flew from one clump of the pollen plant to the next, spent little time at any one clump." The *Triumfetta* shrubs were not common, but were widely dispersed along an arroyo on the Chamela reservation. In addition to captures on that plant, two females were taken at dawn sucking nectar from *Cucurbita*, but intensive examination of *Cucurbita* flowers at dawn and later by bee specialists near Chamela in 1985 revealed no *Mydrosoma*. One specimen was taken by Griswold and Parker in a Malaise trap.

Mydrosoma bohartorum new species

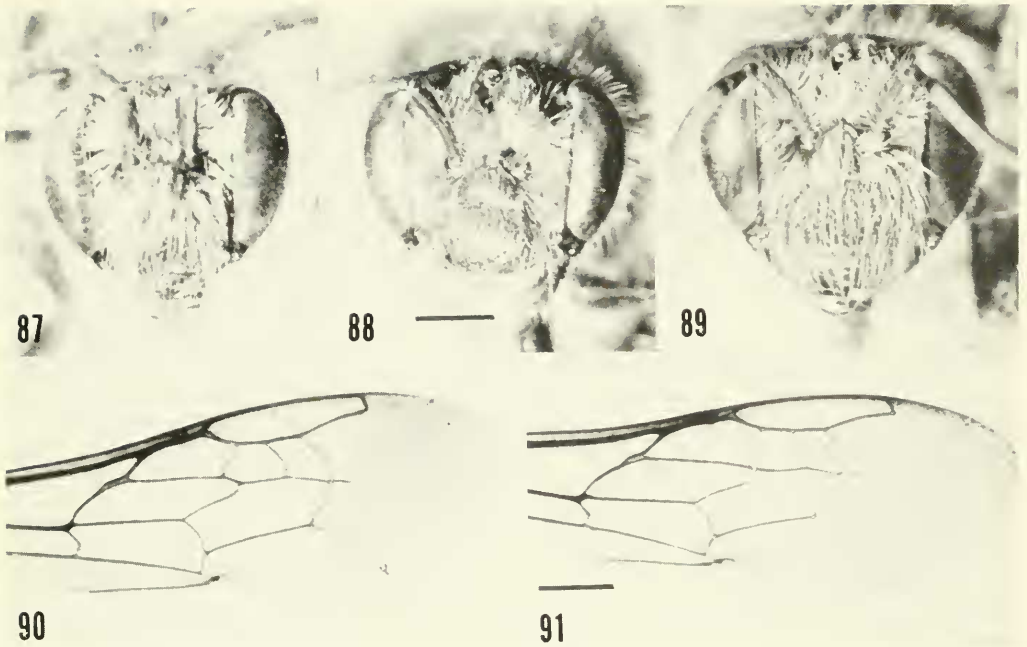
Figs. 80-88, 90

Male: 1. Length 10-11 mm; forewing length 9 mm. 2. Inner orbits more strongly converging below than in *opalinum*, upper extremities converging above. 3. Interantennal distance about equal to antennocular distance. 4. Interocellar distance equal to 2.5 ocellar diameters, slightly less than ocellular distance, slightly greater than ocellocipital distance which is equal to about two ocellar diameters. 5. Distance from median to lateral ocellus slightly less than ocellar diameter. 6. Malar space less than one fourth as long as broad, about one third as long as diameter of second segment of flagellum. 7. Labrum shining, smooth, convex except flattened medially, with two small ridges across



Figures 80-86. *Mydrosoma bohartorum*, male. Scale lines (for leg and antenna, and for terminalia) = 1 mm. 80, Antenna; 81, outer view of hind leg; 82, 83, lateral, dorsal, and ventral views of eighth sternum; 84, dorsal and ventral views of seventh sternum; 85, 86, dorsal, ventral and lateral views of genitalia.

base. 8. *Flagellomere 1* about as broad as long, over half as long as 2 which is nearly 1.5 times as long as broad. 9. Flagellum not crenulate, distal half tapering, no hairy zones as in *M. opalinum*. 10. Second recurrent vein joining second submarginal cell near end of its first third (or quarter). 11. *Legs unmodified*. 12. Hind femur less than three times as long as broad, under



Figures 87-89. Faces. Scale line = 1 mm. 87, *Mydrosoma bohartorum*, male paratype; 88, same, female allotype; 89, *M. sinaloa*, female holotype.

Figures 90-91. Forewings. Scale line = 1 mm. 90, *Mydrosoma bohartorum* (paratype); 91, *M. sinaloa* (holotype).

surface smooth, distal half slightly concave. 13. Hind tibia well over three times as long as broad, expanded gradually toward apical third, outer surface convex and hairy, inner surface slightly concave and bare near and basal to middle; *transverse striae lacking*. 14. Hind basitarsus nearly two thirds as long as tibia, nearly straight, thickest near base but tapering only slightly, about as long as remaining tarsal segments taken together. 15. *S I simple*, hairy except for impunctate apical zone which is widest medially; *S VI simple*, hairy except for bare apical margin. 16. Clypeal surface easily visible through sparse vestiture, punctures coarse and very shallow so that surface is coarsely reticulate, more strongly so apically and weakly so basally; ground in and between punctures minutely roughened and dull; supra-clypeal area and adjacent part of paraocular area with small dense punctures on dull ground; rests of paraocular area and frons with punctures minute, widely scattered on dull ground, but upper paraocular area and vertex between ocelli and eye broadly depressed, smooth, shining, and hairless. 17. Vertex largely impunctate except band of small but strong punctures across posterior margin. 18. Thorax with large

punctures, those of scutum about as large as on lower clypeus; posterior disc of scutum and center of scutellum with punctures separated by a puncture width or more, and hypoepipimeral area with lower and anterior margins impunctate, elsewhere punctures closer; surface between punctures minutely roughened but more shining than face; propodeal triangle minutely roughened but rather shiny. 19. Metasomal terga with punctures about as coarse as on thorax, coarser on T VI; ground between punctures shining and rather smooth, a little roughened on T VI and distinctly so on T VII; T I-VI with broad apical zones of slightly finer and more widely spaced punctures, this zone scarcely recognizable on T I but *broadly impunctate basally on T III-V*; some fine punctures near the margins of T III-V. 20. Sterna and lateral parts of terga with punctures closer and coarser than on tergal dorsa, S I-VI with well defined, impunctate, bare, apical marginal bands. 21. Integument black except as follows: mandible with apical half dark red; flagellum with under side dark brown; tegula, tarsi (except largely black claws), apices of fore and mid tibiae, and anterior side of fore tibia yellow-brown (ill-defined premarginal bands on T II and III of

paratype dark brown); T I to V with faint bluish and greenish reflections; apical margins of terga and of sterna I-V translucent brownish. 22. Wings, especially apical third, brown, veins and stigma brown except vein R of forewing which is blackish. 23. Pubescence yellowish white, white on thoracic venter and metasoma, yellow on tarsi and fore tibia, dusky hairs on discs of T III-V; all hairs of T VI and VII dusky; T II (laterally) and III-V with sparse apical bands of whitish hair.

Female: 1f. Length 11.5 mm; forewing length 9 mm. 2f. As in male but orbits only slightly converging. 3f. Supraclypeal area rather uniformly convex except for protuberant frontal tubercle, markedly shorter than distance from its upper end (upper margins of antennal sockets) to anterior margin of median ocellus; interantennal distance equal to antennocular distance. 4f. Interocellar distance shorter than ocellular distance and greater than ocellocapital distance, the last about 1.3 times ocellar diameter. 5f. Distance from median to lateral ocellus about three fifths of ocellar diameter. 6f. As in male but malar space less than one fifth as long as broad. 7f. Labrum shining, nearly smooth with a complete ridge and several incomplete small ridges across base. 9f. Middle flagellar segments as broad as long. 10f. As in male. 14f. Hind basitarsus as in *M. opalinum* but scarcely concave. 16f. Clypeal surface gently convex with coarse punctures, mostly separated by less than a puncture width below, becoming finer and denser above; ground in and between punctures minutely roughened and dull; disc of supraclypeal area impunctate but dull, lateral margin of that area, paraoocular area, and frons with small punctures, surface dull, except for ill-defined fovea on upper paraoocular area and extending between ocelli and eye which is impunctate, shining, but minutely roughened. 17f. As in male. 18f. As in male but punctures finer than largest ones of clypeus. 19f. Metasomal terga with punctures dorsally finer and sparser than on thorax except for T V, ground and apical zones as in male but impunctate bases of these zones on T IV and V only and ill-defined, broken medially on T IV by scattered punctures; small dense punctures on apical margins of T I to IV. 20f. Sterna with punctures dense, finer than on corresponding terga. 21f. Integument black, legs dark brown especially toward apices; mandible with apical half dark red; under side of flagellum, tegula and tibial spurs light brown; anterior side of fore tibia and small segments of tarsi red-brown; T I-IV with faint bluish and greenish reflections; S I-V with

posterior margins and bases (not always exposed) red-brown. 22f. As in male. 23f. Hair largely yellowish white but light fulvous with a few fuscous hairs intermixed on vertex, dorsum of thorax, and pronotal lobe; yellow on clypeal margin, mandible, labrum, front coxa, front and mid tibia, and upper sides of all tarsi; orange on under sides of tarsi. Outer side of hind tibia with black hairs on basitibial area, grading through brown to yellowish beyond middle of tibia; apex of hind femur with brown hairs. Short hairs on discs of T III and IV fuscous; T V with hairs blackish except white at extreme sides and coppery in middle of apical margin. S I and II with hairs yellowish white, forming long, preapical fringes; *on other sterna hairs shorter, widespread over surface*, fringes less conspicuous, especially on S V; S III with hairs yellow; S IV to VI with hairs orange to fulvous. Posterior margins of T I-IV with narrow bands of white plumose hairs arising from tergal margins and extending beyond them; band of T IV not appreciably wider than others.

Type material: Holotype male, allotype female, and one male and three female paratypes, 15 mi (24 km) northeast of Guadalajara, Jalisco, Mexico, September 17, 1970 (G. E. and R. M. Bohart). [Holotype and allotype, Mexico; one female paratype, Lawrence; other paratypes, Logan.]

The species is named for the brothers George E. and Richard M. Bohart who collected the specimens and have contributed so much to the knowledge of Hymenoptera.

Mydosoma sinaloa new species

Figs. 89, 91

Female: 1f. Length 11.5 mm; forewing length 9.5 mm. 2f. Inner orbits scarcely converging below; upper parts strongly converging above. 3f. *Supraclypeal area only slightly convex below frontal tubercle; clypeus in profile flat in upper four fifths, then abruptly declivous to shining marginal zone*; supraclypeal area about as long as distance from its upper end (upper margins of antennal sockets) to anterior margin of median ocellus; interantennal distance about equal to antennocular distance. 4f. Interocellar distance equal to ocellular distance and greater than ocellocapital distance which is about 1.5 times ocellar diameter. 5f. Distance from median to lateral ocellus about two thirds of ocellar diameter. 6f. Malar space less than one fifth as long as broad, its length about one third of flagellar diameter. 7f. Labrum shining, smooth, convex, with ridge

across base. 9f. Middle flagellar segments slightly longer than broad. 10f. *Second recurrent vein interstitial with first transverse cubital*. 14f. Hind basitarsus on outer surface smooth, shining, scarcely concave, with hairs rather short and sparse. 16f. Clypeus with punctures fine and close near upper and lateral margins, progressively coarser toward lower margin of flat part of clypeus; except near that margin punctures so close that surface is coarsely reticulate, a narrow, irregular longitudinal median ridge slightly more elevated than other ridges between punctures; below lower edge of flat part of clypeus is declivous finely and closely punctate band leading to smooth impunctate margin which is broader than in similar species, about as wide as base of first flagellar segment; surface both within and between punctures minutely roughened but shining; rest of face minutely roughened and dull, frons especially dull; supraclypeal area with punctures on margins but disc without punctures; rest of face and genal area with punctures similar to or finer than finest punctures of clypeus, on frons especially scattered and small; upper paraocular area with broad, depressed, ill-defined, impunctate, shining foveal area extending up between ocelli and eye. 17f. Vertex largely impunctate and shining except for band of small punctures across posterior margin. 18f. Thorax strongly punctate, punctures much smaller than largest ones on clypeus; discs of scutum and scutellum without areas of especially widely separated punctures but anterior and lower margins of hypopleural area impunctate; surface between punctures minutely roughened but more shiny than most of face; propodeal triangle minutely roughened but rather shiny. 19f. Metasoma with punctures finer than those of thorax except for T V, ground shining, only feebly minutely roughened; terga with broad, apical zones poorly differentiated but with punctures slightly sparser than on rest of terga, especially on T III and IV; small dense punctures on apical margins of T I to IV. 20f. Sterna with punctures dense, similar to those of sides of corresponding terga. 21f. Integument black; lower three fourths of clypeus, under side of scape, and legs dark reddish brown; lower margin of clypeus, basal two thirds of mandible, under side of flagellum, tegula, tibial spurs, anterior side of front tibia, and small segments of tarsi yellow-brown; posterior margins of T I to IV narrowly pallid; T I-IV with faint bluish and greenish reflections; posterior margins of S I to V bright fulvous. 22f. Wings light brown, veins and stigma brown except vein R of forewing which is black. 23f.

Hair largely yellowish white but light fulvous without dark hairs intermixed on vertex, dorsum of thorax and pronotal lobe; yellow on clypeal margin, mandible, and labrum; yellowish orange on tibiae and tarsi, verging toward dusky on outer sides of front and mid tibiae and dusky, blackish toward base, on outer side of hind tibia. Short hairs on discs of T II to IV fuscous; T V with black hairs, ochraceous at extreme sides and coppery in middle of apical part. *Hairs about equally long on S II to V*, yellowish white on S II, *bright fulvous on S III to V*. Posterior margins of T I-IV with narrow bands of white plumose hairs arising from extreme tergal margins and extending beyond them; band of T IV not wider than others.

Type material: Holotype female, 50 miles (80.5 km) northeast of Mazatlan, Sinaloa, Mexico, September 9, 1970 (W. J. Hansen, T. L. Whitworth) [Mexico].

This is the northernmost known *Mydrosoma*. The specific name is a noun in apposition—the state in which the specimen was collected. The most distinctive features are italicized in the above description.

SPECIES INCORRECTLY INCLUDED
IN DIPHAGLOSSINE GENERA

The species listed below were described as members of diphaglossine genera but are now known to belong elsewhere:

Species	Current Position
<i>Apista gaullei</i> Vachal, 1909	<i>Eulonchopria</i> (Michener, 1985)
<i>Apista limbella</i> Vachal, 1909	<i>Eulonchopria</i> (Michener, 1985)
<i>Diphaglossa spinolae</i> Crawford & Titus 1904	<i>Mourecotelles</i> (Toro & Cabezas, 1977)
<i>Diphaglossa ecuadoria</i> Friese, 1925	Undescribed para- colletine genus

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well as the opportunity for field work relating to it. Dr. J. G. Rozen, Jr. of the American Museum of Natural History, also supplied an account of his experience with the same species at the same place. Joetta Weaver did the necessary typing and editing.

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LITERATURE CITED

- Ashmead, W. H. 1899. Classification of the bees, or the superfamily Apoidea. Trans. Amer. Entom. Soc., 26:49-100.
- Cockerell, T. D. A. 1904. The bee genus *Apista*, etc. Canadian Entom., 36:357.
- Crawford, J. C. and E. S. G. Titus. 1904. A new bee in the genus *Diphaglossa*. Canadian Entom., 36:48-50.
- Dalla Torre, C. G. de. 1896. Catalogus Hymenopterorum, 10:i-viii + 1-643.
- Ducke, A. 1910. Zur Synonymie der neotropischen Apidae. Deutsch. Entom. Zeitschr., 1910:362-369.
- Friese, H. 1899. Monographie der Bienengattungen *Megacilissa*, *Caupolicana* und *Oxaea*. Ann. K. K. Naturhist. Hofmus. [Wien], 14:239-246.
- Friese, H. 1910. Zur Bienenfauna des sudlichen Argentinen. Zool. Jahrb., Abt. f. Syst., Geogr. u. Biol. d. Tiere, 29:641-660.
- Friese, H. 1925. Neue neotropische Bienenarten, zugleich II. Nachtrag zur Bienenfauna von Costa Rica. Stettiner Entom. Ztg., 86:1-41.
- Haliday, A. H. 1836. Descriptions, &c of the Hymenoptera, pp. 316-331, in J. Curtis, A. H. Haliday, and F. Walker, Descriptions, &c of the insects collected by Captain P. P. King, R. N., F. R. S. in the survey of the Straits of Magellan. Trans. Linnæan Soc. London, 17: 315-359.
- Herbst, P. 1917a. Durchsicht der von Spinola in der von Claude Gay 1851 herausgegebenen Historia fisica y politica de Chile. Zoología, Vol. VI beschriebenen Apidae, nebst einigen einleitenden Bemerkungen. Deutsch. Entom. Zeitschr., 1917:257-292.
- Herbst, P. 1917b. Nachtrag zur Synonymie chilenischer Apidae. Deutsch. Entom. Zeitschr., 1917:293-294.
- Herbst, P. 1921. Über chilenische Hymenopteren, welche Brethes erwähnte. Stettiner Entom. Ztg., 82:108-112.
- Herbst, P. 1923. Nuevas avispas antofilas Chilenas. Rev. Chilena Hist. Nat., 27:73-80.
- McGinley, R. J. 1981. Systematics of the Colletidae based on mature larvae with phenetic analysis of apoid larvae. Univ. California Publ. Entom., 91:i-xv + 1-307.
- Michener, C. D. 1966. The classification of the Diphaglossinae and North American species of the genus *Caupolicana*. Univ. Kansas Sci. Bull., 46:717-751.
- Michener, C. D. 1985. A fourth species of *Eulonchopria* and a key to the species (Hymenoptera, Colletidae). Jour. Kansas Entom. Soc.
- Moure, J. S. 1945. Contribuição para o conhecimento dos Diphaglossinae, particularmente *Piloglossa*. Arq. Mus. Paranaense, 4: 137-178, pl. xv.
- Moure, J. S. 1953. Notas sobre Colletidae sul-americanos. Dusenía, 4:61-78.
- Otis, G. W., R. J. McGinley, L. Garling and L. Malaret. 1982. Biology and systematics of the bee genus *Crawfordapis*. Psyche, 89: 279-296.
- Reed, E. C. 1892. Revision de las abejas chilenas descritas en la obra de Gay. Act. Soc. Sci. Chile, 2:223-239.
- Roubik, D. W. and C. D. Michener. 1985. Nesting biology of *Crawfordapis* in Panamá. Jour. Kansas Entom. Soc., 57:662-671.
- Sandhouse, G. A. 1943. The type species of the genera and subgenera of bees. Proc. U. S. Nat. Mus., 92:519-619.
- Smith, F. 1853. Catalogue of hymenopterous insects in the collection of the British Museum, part 1:[i-iii] + 1-197, pls. I-VI.
- Smith, F. 1862. Descriptions of new genera and species of exotic Hymenoptera. Jour. Entom., 1:146-155.
- Smith, F. 1879. Descriptions of new species of Hymenoptera in the collection of the British Museum. xxi + 240 pp.
- Snelling, R. R. 1980. The genus *Bicornelia*. Contrib. Sci. Nat. Hist. Mus. Los Angeles Co., no. 327:1-6.
- Spinola, M. 1851. Himenopteros, in C. Gay, Historia fisica y politica de Chile, 6:153-569.
- Toro, H. and V. Cabezas. 1977. Nuevos generos y especies de Colletini sudamericanos. An. Mus. Hist. Nat. Valparaíso, 10:45-64.
- Vachal, J. 1904. Voyage de M. G. A. Baer au Tucuman (Argentine), Hymenoptera Mellifera. Revue d'Entom., 23:9-27.
- Vachal, J. 1909. Espèces nouvelles ou litigienses d'Apidae du haut bassin du Parana et des regions contigues et delimitation d'une nouvelle sous-famille Diphaglossinae. Rev. d'Entom., 28:1-58 (pp. 59-72, 1910).